Catalogue of Measures for Biodynamic Viticulture

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Purpose and scope

This catalogue is a practical working document for winegrowers, advisors and project partners who want to understand which measures are relevant when converting a vineyard from organic or low-input management towards biodynamic viticulture. It is not designed as a philosophical essay, a certification manual or a complete plant-protection guide. Its function is to translate practical and technical knowledge into field-level measures that can be planned, implemented, observed and reviewed.

The catalogue presents a set of priority measures selected because they are fundamental to biodynamic viticulture. Each measure is described through basic information, implementation, benefits, limitations and sources. The aim is to support practical farm planning, advisory discussion and consistent implementation across different vineyard contexts.

Biodynamic viticulture should be understood as a system. The preparations are not a substitute for sound viticulture. A vineyard with compacted soil, unmanaged vigour, poor pruning architecture, weak organic matter dynamics or an absent biodiversity strategy will not become resilient simply because preparations are sprayed. The practical sequence is therefore: first stabilise the vineyard organism; then introduce the biodynamic preparations rhythmically; then improve the coherence of the whole farm through compost, animals, landscape structures and cooperation.

The working logic of the catalogue is direct: better wine depends on better grapes, better grapes depend on healthier vineyards, and healthier vineyards depend on balanced vines, living soil, a resilient environment and well-timed work. Timing is therefore treated as a management discipline rather than as an accessory. Late or improvised operations are a major reason why biodynamic work becomes superficial.

Practical hierarchy of measures

- Foundation measures: soil cover, traffic management, pruning architecture, canopy balance, fertility management and compost quality.
- Biodynamic core measures: 500/500P, 501, compost preparations 502-507, horsetail 508 and careful attention to timing and storage.
- Support measures: botanical extracts, compost teas, stress-relief applications, reduction of unnecessary inputs and adaptation of plant protection to site pressure.
- Farm organism measures: animal integration, biodiversity elements, hedgerows, cooperation, manure/fodder exchange, shared machinery and shared expertise.
- Processing link: winemaking should preserve the quality created in the vineyard and should not be treated as an isolated cellar technique.

Certification and legal disclaimer

Demeter and Biodynamic certification requirements are defined by the competent national organisation and by the International Demeter Biodynamic Standard. This catalogue may help organise work and advisory discussion, but it does not replace certification rules, national organic legislation, plant protection law, animal welfare law, veterinary rules or winery regulations. Where a substance is mentioned as useful in practice, its use must still be checked against the applicable national regulatory framework and the farm's certification body.

Structure of each measure

- Each measure begins with an overview table for quick orientation.
- The technical text then explains objective, implementation, benefits, limitations and monitoring points.
- Sources are listed at the end of each chapter so that the catalogue remains transparent without overloading the measure tables.

Sources

- VITA Project. Action List of Expected Outputs - Biodynamic Viticulture Catalogue. Internal project guideline, 2026.

- Biodynamic Federation - Demeter International. International Demeter Biodynamic Standard: Production, Processing and Labelling. Current standard page: https://demeter.net/certification/standard/.

- Biodynamic Federation - Demeter International. Biodynamic Preparations. https://demeter.net/biodynamics/biodynamic-preparations/.

2. Measures

The measures in this catalogue were carefully selected by the experts involved in the VITA project to reflect the practical needs of implementing biodynamic approaches in Central and Eastern European viticulture. The selection was based on interviews with directly involved winegrowers in the Czech Republic (Slovakia), Croatia, Hungary and Poland. The catalogue therefore focuses on measures that are relevant for real vineyard conditions, advisory work and step-by-step transition towards biodynamic management.

Measure 1 - Soil cover, cover crop and traffic management

Objective	Keep living cover in the vineyard while controlling water competition, traffic damage, erosion and excessive vigour.
Core actions	Select permanent, annual or alternating cover according to rainfall, slope, soil depth, traffic needs and vine vigour. Integrate species-rich mixtures, legumes, grasses and spontaneous vegetation where suitable. Manage mowing, rolling, grazing and under-vine strips deliberately.
Benefits	Reduced erosion, improved infiltration, higher biological activity, greater trafficability, more biodiversity, better nutrient cycling and, in vigorous sites, improved vine balance.
Limitations / risks	Water and nutrient competition in dry years or shallow soils; frost-risk changes; excessive humidity if cover is unmanaged; seed costs; need for mowing, rolling or grazing equipment.

Basic information

Soil cover is a precondition for credible biodynamic viticulture. In practical terms, it is the measure that connects erosion control, soil biological activity, fertility, biodiversity and machinery access. A vineyard is a permanent crop often situated on slopes, with repeated passes in the same inter-rows and a long production horizon. This makes bare soil and unmanaged compaction particularly problematic. The aim is not to create a visually uniform green carpet, but to manage a living soil surface adapted to the site.

Cover crops in vineyards can be permanent, annual, spontaneous, sown, full-surface, alternate-row or under-vine. They can also be managed as biomass for mulching or as forage for grazing animals. The decision should not be ideological. It must follow the climatic water balance, the soil depth, the risk of erosion, vine vigour, production objective, row spacing, machinery, availability of grazing animals and the capacity of the farmer to intervene at the right time.

For biodynamic viticulture, soil cover has an additional function: it helps the vineyard move away from a simplified monoculture. Diverse root systems, different flowering windows and continuous organic matter inputs support the development of the vineyard as a more coherent farm organism. In the language of practice, this means more rooting channels, more soil aggregates, less runoff, better traction, more insect life and more opportunities for internal nutrient cycling.

Permanent versus annual cover

Permanent cover is most appropriate where rainfall, soil depth and vine vigour allow it. It is especially relevant on erosion-prone slopes, heavy soils that need structure, vineyards where repeated machinery passes cause compaction, and sites where biodiversity is a core objective. Permanent cover should not be unmanaged grass. A biodynamic vineyard benefits from a mixture that includes grasses for structure and trafficability, legumes for nitrogen dynamics, flowering herbs for insects and deep-rooting species for soil opening.

Annual cover crops are useful where water competition must be carefully controlled, where establishment of perennial vegetation is difficult, or where the grower wants to adjust species according to the season. Winter annuals can protect the soil during the rainy period and be terminated before summer drought. In drier sites, annual covers may be used in alternate rows while the other rows are kept in lower vegetation or mulch. This creates flexibility while avoiding full bare cultivation.

Spontaneous vegetation can be valuable if it is diverse and not dominated by problematic weeds. It should be observed before being destroyed. A species-poor grass cover in a dry vineyard may compete heavily for water, while a diverse spontaneous cover containing low-growing legumes and flowering species may provide services similar to a sown mixture. The decision criterion is function, not origin.

Implementation steps

1. Map the vineyard by risk zones: erosion hotspots, compacted alleys, vigorous blocks, weak blocks, frost pockets, shallow soils and areas with poor infiltration.
2. Define the main objective of the cover in each block: erosion control, traffic bearing, nitrogen fixation, weed suppression, biodiversity, biomass production, grazing or vigour regulation.
3. Choose the cover strategy: permanent full inter-row cover, alternating permanent cover, winter annual cover, temporary green manure, spontaneous cover with selective mowing, or under-vine cover/mulch.
4. Plan termination or suppression before water competition becomes damaging. In dry regions this may mean rolling, mowing, grazing or shallow mechanical suppression before flowering or before the onset of vine water stress.
5. Use machinery routes consistently. Permanent traffic lanes, lower tyre pressure, lighter machinery and avoiding passes on wet soil are as important as the plant mixture itself.
6. Review annually through observation: soil cover percentage, infiltration, earthworms, rooting depth, ease of machinery movement, vine vigour, disease pressure and grape quality.

Species selection

A balanced mixture can combine functional groups. Grasses contribute root density, soil structure and trafficability. Legumes such as clovers, vetches or medics contribute nitrogen and high-quality biomass. Brassicas and other deep-rooting species can open compacted layers but require careful management so that they do not become too competitive. Flowering herbs contribute to beneficial insects, pollinators and wider biodiversity. In biodynamic contexts, species diversity is generally preferable to single-species covers, provided the mixture remains manageable.

For Central and Eastern European vineyards, mixtures should also reflect winter survival, spring growth speed, drought tolerance, mowing response and local seed availability. Species choice may differ substantially between Austrian, Hungarian, Polish, Croatian and Czech vineyards. The practical approach is therefore a decision framework based on site conditions, not a universal seed recipe.

Flowering inter-row cover combining legumes and herbs to support soil cover, beneficial organisms and functional biodiversity.

Sowing inter-row vegetation in a vineyard with dedicated equipment; establishment method should be adapted to slope, traffic intensity and water availability.

Benefits

- Erosion control through better soil cover and improved aggregate stability.
- Higher infiltration and reduced runoff, especially important on sloping vineyards.
- More organic matter inputs from roots and residues.
- Improved trafficability and reduced compaction when permanent alleys are well established.
- Better habitat continuity for beneficial organisms and pollinators.
- Potential regulation of excessive vine vigour and improved cluster microclimate when water and nitrogen are balanced.

Limitations and risk management

The main risk is unmanaged competition. Cover crops can reduce yield, pruning weight or grape development when water is limiting. This is not a failure of cover cropping; it is a failure of cover crop design or timing. In dry and shallow sites, use alternate rows, winter covers, early termination, low-growing species, mulch or partial under-vine cover. In vigorous and humid sites, more competitive cover may be positive because it reduces excessive vegetative growth and improves canopy microclimate.

A second risk is traffic compaction. Vegetation does not automatically eliminate compaction if machinery passes are too frequent, too heavy or too late after rain. Biodynamic viticulture should connect cover crop design with traffic management. If tramlines are compacted, introduce deep-rooting species, reduce axle loads and consider controlled traffic. In high-value vineyards, spade diagnosis or simple infiltration tests should become part of annual monitoring.

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Measure 2 - Canopy management, pruning and vine longevity

Objective	Build vine architecture that maintains sap flow, reduces wood disease risk, controls vigour and creates a resilient canopy with good light and air distribution.
Core actions	Choose a training system according to site and variety. Prune to avoid large wounds, maintain sap flow, leave appropriate drying cones, disinfect tools, select shoots in spring, manage leaf area and crop load, and avoid purely mechanistic pruning decisions.
Benefits	Longer vine life, lower risk of esca/eutypa-type decline, better canopy microclimate, reduced fruit disease pressure and more stable grape quality.
Limitations / risks	Requires skilled labour and observation; change is slow in old vineyards; some old architecture cannot be corrected in one season; labour peaks can conflict with other biodynamic operations.

Basic information

Pruning is one of the most important “preparations” in viticulture, even though it is not a biodynamic preparation in the narrow sense. The vine is a perennial liana forced into a productive architecture by human intervention. In biodynamic viticulture, pruning is therefore not merely a winter task to set crop load. It is a long-term intervention into plant form, sap flow, wound healing, disease susceptibility and the rhythm of vegetative and generative growth.

In many Central-Eastern European regions, vineyards were historically shaped by production systems that prioritised mechanisation and quantity over vine individuality and longevity. Wide rows, universal trellises, mixed varieties, inappropriate training systems and simplified pruning decisions created vineyards that are difficult to manage biologically. This history matters because biodynamic conversion often begins not with a clean ideal system, but with inherited vine architecture.

Wood diseases such as esca, esca-like symptoms, eutypiosis and black dead arm cannot be solved by a simple curative product. The practical basis is prevention: careful winter pruning, minimisation of large wounds, respect for sap flow, tool hygiene, avoiding unnecessary cuts, and spring shoot selection that maintains a balanced canopy. This makes pruning and canopy management a central measure for vineyard resilience.

Measure objective

The objective is to create a vine that can live long, express the site and maintain physiological balance without excessive corrective inputs. A well-pruned vine has a coherent structure, renewal positions that are not continuously moving into dead wood, wounds that are as small and as well placed as possible, and a canopy that can dry rapidly after rain while maintaining adequate photosynthesis.

Implementation: winter pruning

1. Start by reading the vine, not by applying a fixed formula. Identify age, vigour, previous cuts, necrosis, trunk flow, variety behaviour and the intended training system.
2. Avoid large cuts wherever possible. Large wounds create larger desiccation cones and increase the probability that necrosis enters functional wood.
3. Maintain sap flow. Select positions so that the flow from roots to shoots remains as continuous as possible. Avoid leaving renewal points that force the vine into repeated crossing of dead zones.
4. Leave sufficient length where a drying cone is expected. The objective is not a flush cut, but a controlled drying zone that does not compromise the permanent structure.
5. Retain basal buds only when they are useful for the chosen architecture and variety. Do not automatically keep the strongest shoot if its position damages the long-term structure.
6. Disinfect secateurs at least daily and more frequently where symptoms of trunk diseases are visible. In blocks with serious symptoms, organise work so that infected vines are pruned last.
7. Use wound-protection practices where appropriate and legally/certification permitted, especially after larger cuts or on sensitive varieties.

Implementation: spring and summer canopy management

Winter pruning creates the potential structure, but spring shoot selection determines how that structure functions in the current season. Poor shoot selection can create dense canopies, poor airflow, shaded clusters and higher fungal disease pressure. It can also compromise the next winter pruning by leaving poorly positioned renewal wood. In biodynamic management, green work should therefore be seen as disease prevention and future architecture management.

- Remove poorly positioned, crowded or unproductive shoots early enough that the vine does not waste excessive energy on them.
- Maintain a canopy that allows air movement and light penetration without exposing clusters to sunburn risk.
- Adapt leaf removal to variety, climate and disease pressure. In humid seasons, cluster-zone ventilation becomes more important; in hot dry seasons, excessive exposure can be damaging.
- Use shoot positioning to reduce overlap and create a regular vertical or chosen canopy plane.
- Balance crop load with vine vigour. Overcropping weak vines undermines resilience; excessive vigour produces compact shade, disease susceptibility and lower fruit concentration.

Biodynamic interpretation

Biodynamic preparations can support plant and soil processes, but pruning is where the grower directly shapes the vine’s organism. The biodynamic concept of balance between vegetative expansion and generative concentration has a clear technical expression in canopy work. A vine with excessive vegetative growth, high shade, compact clusters and weak lignification is vulnerable. A vine that is too weak, drought-stressed or overexposed is also vulnerable. Pruning and canopy work are the field-level tools for avoiding both extremes.

Benefits

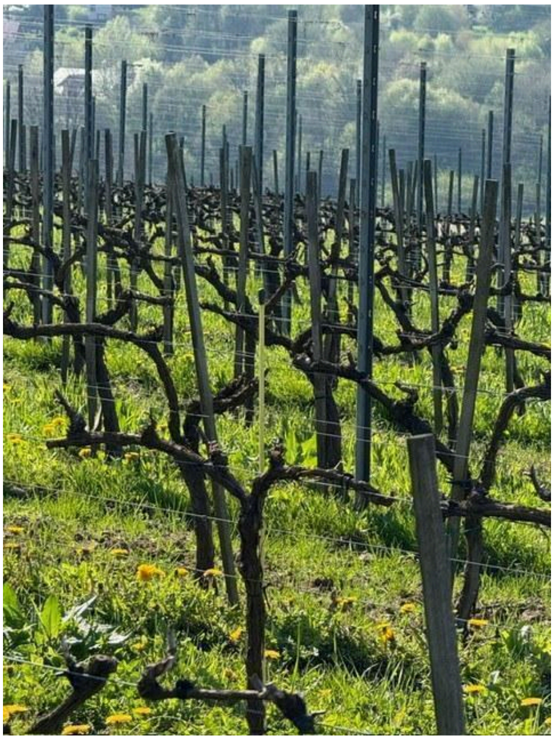
- Reduced incidence and severity of trunk-disease symptoms through prevention-oriented pruning.
- Longer productive life of vines and lower replacement cost.
- Improved canopy microclimate and reduced need for reactive disease-control interventions.
- More stable ripening, better lignification and better relationship between crop and leaf area.
- A vineyard that is easier to read, plan and treat with preparations because vine growth is more coherent.

Limitations and practical barriers

The main limitation is labour quality. A poor pruning cut cannot be corrected by a later spray. Workers need training, feedback and enough time. In old or badly structured vineyards, the first aim may be damage limitation rather than immediate ideal architecture. Converting pruning practice can take several years because permanent wood, old wounds and poorly positioned arms constrain the possibilities. The advisory recommendation should therefore be to establish a block-by-block conversion plan rather than demand perfect architecture immediately.

Monitoring indicators

- Number and size of pruning wounds per vine.
- Position of renewal wood in relation to sap flow.
- Frequency of trunk-disease symptoms and sudden vine drying during ripening.
- Shoot density and canopy porosity before flowering, at bunch closure and before veraison.
- Pruning weight, lignification quality and crop-to-pruning-weight balance.



Balanced vine architecture and early-season soil cover in a vineyard.

Example of problematic old wood structure requiring careful pruning decisions.

Practical field training on pruning, sap flow and vine longevity.

Demonstration of pruning cuts and training-system decisions in the vineyard.

Peer discussion on pruning choices, canopy structure and long-term vine health.

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Measure 3 - Fertility management, composting and humus building

Objective	Build fertility from internal farm resources, prepared compost, cover crops, living soil and careful nutrient cycling rather than soluble external inputs.
Core actions	Assess soil and vine status, compost quality, manure availability and organic matter flows. Apply biodynamically prepared compost where needed. Combine compost with cover crops, reduced tillage, animal integration and erosion control.
Benefits	Improved water retention, nutrient buffering, soil aggregation, microbial activity, resilience to climate extremes and coherent farm fertility.
Limitations / risks	Compost quality varies; over-application can create excessive vigour or nutrient imbalance; manure sourcing may be difficult; machinery and space are needed; legal nutrient limits must be respected.

Basic information

Fertility management in biodynamic viticulture is not limited to adding nutrients. The central question is how the vineyard generates, stores and circulates fertility. Humus, compost, cover crops, animal manure, root activity and microbial transformation are the basic elements. In a vineyard, where the main crop is perennial and where pruning wood, cover crop biomass and grape residues represent continuous flows of organic matter, fertility should be designed as a cycle.

Humus determines much of the vineyard's resilience. It influences water retention, nutrient buffering, aggregate stability, carbon storage, biological activity and root penetration. In a climate with more frequent drought, heat, heavy rain and erosion events, humus-building is not an environmental decoration. It is agronomic risk management.

The biodynamic approach gives special importance to compost and manure. Compost is not merely a waste-treatment product. It is a structured transformation of plant residues, animal manure, soil and microbial processes into a stable fertility source. Prepared compost, using preparations 502-507, becomes a practical connection between soil, plant, animal and farm organism.

Field implementation

Spraying preparations onto compost. Compost management in the vineyard context.

Compost preparations ready for practical use.

Compost preparation material prepared for insertion into the compost pile.

Applying compost preparations into the compost pile during practical work.

1. Create a vineyard fertility map. Use soil organic matter or organic carbon, pH, available nutrients, compaction observations, slope erosion, vine vigour and yield history.
2. Quantify organic matter flows: pruning residues, cover crop biomass, grape pomace, manure, straw, compost, mulch and external inputs.
3. Assess whether the vineyard has access to animal manure. If not, prioritise cooperation with farms that can exchange manure, compost, straw, fodder or grazing services.
4. Produce or source mature compost. Unstable compost, anaerobic material or material with high weed seed or pathogen risk is unsuitable for high-quality biodynamic viticulture.
5. Use biodynamic compost preparations 502-507 in compost, manure, deep litter or slurry according to Demeter rules and competent technical guidance. The goal is regulated decomposition and humus formation.
6. Apply compost according to soil need and vine vigour, not by routine. Weak, shallow or eroded zones may need different rates than vigorous lower slopes.
7. Integrate compost application with 500/500P, cover crop establishment and traffic management. Applying compost to a compacted, eroding, frequently cultivated soil without changing the system gives limited effect.
8. Monitor response. Watch vigour, pruning weight, canopy density, yield, grape quality, soil smell, aggregate stability and infiltration.

Source control and quality assurance

In composting, quality begins before the pile is built. The grower must know the origin of every input: manure, straw, pruning wood, grape pomace, green waste, leaves, soil, clay, basalt or other mineral additions. This is especially important where fertility sources come from outside the farm. External biomass should not enter the biodynamic cycle anonymously. Supplier, material type, collection date, storage history, contamination risk and certification relevance should be documented.

Bruno Follador’s public composting work emphasises that the compost yard reveals the health and quality of the farm organism. In practical vineyard terms, this means that compost should be assessed as a living process rather than treated only as a nutrient product. Clean inputs, correct moisture, aerobic transformation, good structure and sensory evaluation are part of the same quality-control system.

When external manure or green waste is used, quality control should include at least: visual inspection for plastic, glass, metal and treated wood; odour check for anaerobic material; review of herbicide, pesticide and veterinary-medicine risk; weed-seed and pathogen risk; heavy-metal and copper relevance where municipal or vineyard residues are involved; and basic chemical analysis when larger quantities are applied repeatedly.

Compost quality criteria

- Mature, stable, earthy smell; no putrid or anaerobic odour.
- Balanced moisture: not dry and dusty, not waterlogged.
- Moderate temperature at maturity; no active overheating at application.
- Recognisable but transformed structure; no large uncomposted residues that interfere with application.
- Known source materials and absence of prohibited or contaminated inputs.

- Prepared with biodynamic compost preparations where intended for Demeter/biodynamic use.

Fertility and vine balance

The aim is not maximum vigour. Excessive nitrogen and excessive water availability may produce large canopies, dense clusters, poor lignification, higher disease pressure and lower fruit concentration. Compost and legumes must therefore be adapted to the site. In vigorous blocks, fertility management may focus more on carbon, structure and moderate biological activity than on nitrogen supply. In weak blocks, the strategy may include compost, legume covers, reduced competition and specific support sprays.

Benefits

- Higher soil biological activity and more stable soil structure.
- Improved water retention and buffering under climate extremes.
- Better nutrient cycling and reduced dependence on external fertilisers.
- Potentially more balanced vine vigour and improved resilience to stress.
- Closer connection between vineyard, animals, landscape and human management.

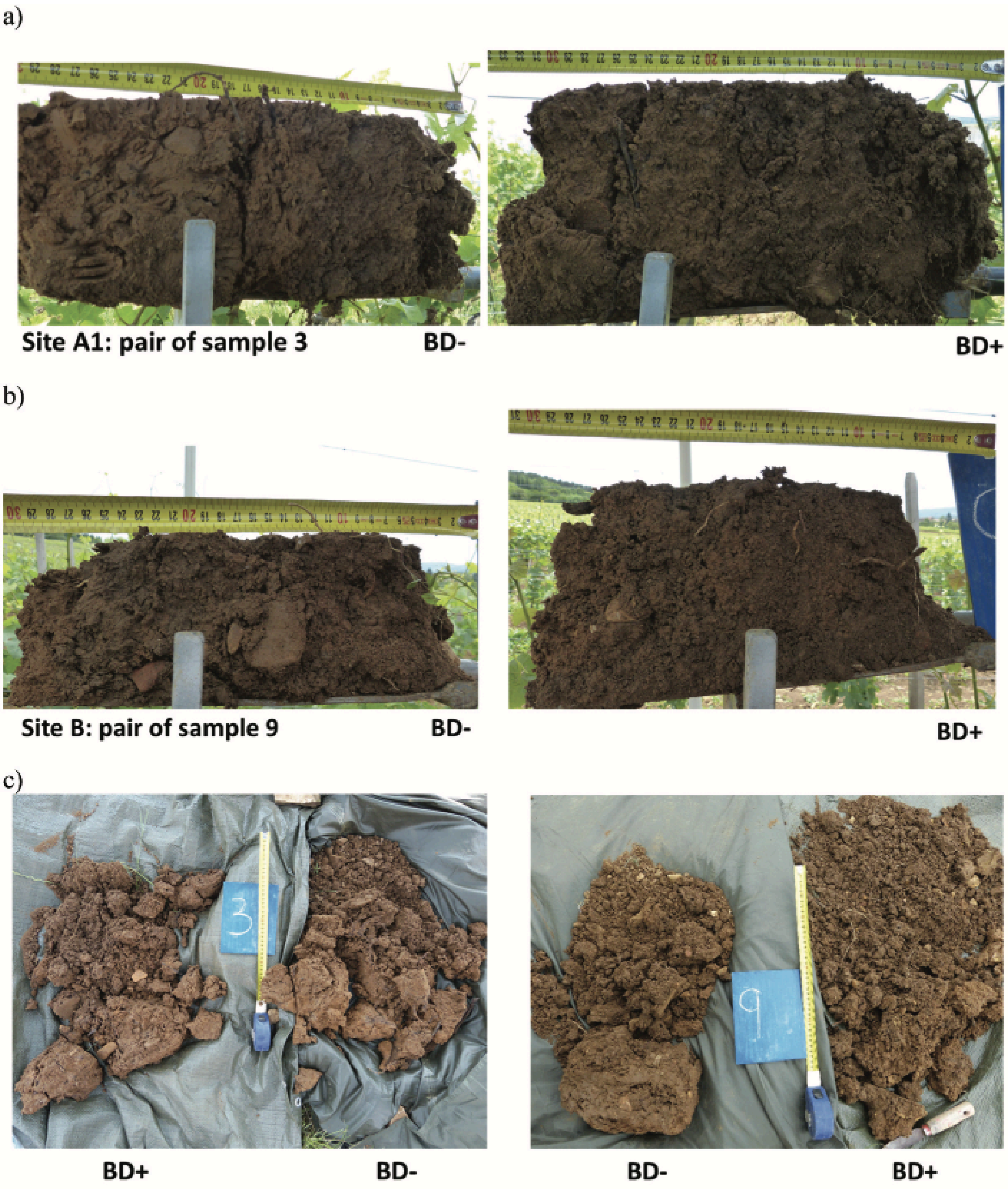
Compost storage and handling

Finished compost should be stored so that biological quality is preserved. It should not dry into an inert powder, become waterlogged, or return to anaerobic conditions. Storage areas should prevent nutrient leaching, runoff into watercourses, contamination by machinery oils or waste, and mixing with low-quality materials. In wet climates, a breathable cover or roofed storage can protect the pile while allowing gas exchange. In dry periods, moisture should be monitored so that biological activity does not collapse before application.

Compaction of the compost pile during storage should be avoided. Turning or loosening may be needed if the pile becomes anaerobic, but unnecessary disturbance of mature compost should also be avoided. The best storage strategy is therefore not indefinite storage, but planned production: prepare compost for the season in which it will be used, keep it stable and protected, and apply it when the soil can receive it.

Field response and monitoring

Soil clods from vineyard samples used to observe aggregation and rooting.



Comparison of soil structure in field samples (BD- and BD+ pairs).

Compost response should be evaluated in the vineyard, not only in the compost yard. Visible response may be gradual. Useful indicators include soil smell, aggregate stability, infiltration after rainfall, earthworm activity, rooting depth, cover-crop vigour, vine pruning weight, canopy density, leaf colour, nutrient analyses, yield stability and grape health. Positive response is not maximum vegetative growth, but a more buffered, biologically active and balanced vineyard.

Compost application is most effective when combined with soil-cover management, reduced compaction, erosion control, animal integration where possible, and timely use of 500/500P. Where soils are compacted, eroding or repeatedly cultivated, compost alone gives a weaker response because the system continues to lose structure and organic matter.

Limitations and risk management

Compost is powerful only when it is appropriate to the site. Risks include excessive vigour, nutrient imbalance, salt accumulation, weed seed introduction, contamination, poor maturity, insufficient machinery access and conflict with legal nutrient limits. Regular analysis and field observation are needed where compost is applied repeatedly or imported from outside the farm.

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Measure 4 - Biodynamic preparations and seasonal timing

Objective	Apply biodynamic preparations as a planned seasonal practice that supports soil life, plant balance, ripening quality and farm coherence.
Core actions	Prepare infusions, decoctions, macerates, tinctures or distillates from clean biodynamic/organic/wild herbs; apply valerian, nettle, willow, yarrow, chamomile, buckthorn, comfrey and compost tea according to objective and risk.
Benefits	Better planning, more coherent vineyard work, potential support to root activity, vine balance, resilience and grape quality. Certification compliance where relevant.
Limitations / risks	Effects are not equivalent to fertiliser inputs; scientific evidence is mixed and must be presented carefully; timing and plant condition matter; 501 can be risky under drought stress; requires equipment and trained staff.

Basic information

Biodynamic preparations are the best-known practice of biodynamic agriculture, but they should not be isolated from the rest of the system. In a vineyard they are used to support soil processes, plant development and the relationship between vegetative growth and fruit quality. Demeter standards require the use of biodynamic preparations for certified production, but the practical goal should be broader than compliance.

The purpose of the preparations is practical: to connect soil work, plant development, compost management and timing into a coherent seasonal rhythm. In viticulture, the preparations should be scheduled together with pruning, cover-crop management, compost application, disease prevention, ripening observation and harvest planning. Without a plan, biodynamic work becomes reactive, late and inconsistent.

The technical focus is preparation quality, correct storage, careful stirring or dynamisation, suitable weather and plant stage, and documentation of every application. Preparations are applied in very small quantities; their role is not to supply nutrients directly, but to support the formative, biological and rhythmic work of the farm organism.

500 and 500P: soil and root orientation

Preparation 500, horn manure, and 500P, prepared horn manure with compost preparations, are directed primarily towards soil life, root development and transformation of organic matter. According to the Vincent Masson notes, 500P is applied at the beginning of spring around bud burst and after harvest, provided the soil is warm and not dry. The notes stress that application is pointless when the soil is still cold or when the soil is dry. This is a practical point: 500/500P should meet living soil conditions, not calendar formalism.

After harvest is an important window because organic residues and post-season soil activity can be supported. Where there are several plantings in vegetable systems, applications may be repeated before plantings; in viticulture the pattern is more seasonal. For a minimal programme, one annual application in spring or autumn may be used, but a more complete vineyard programme normally combines spring and post-harvest applications, particularly in conversion or weak soils.

Demeter's International Standard gives formal minimums: horn manure or prepared horn manure is spread at the start of the vegetative phase or after harvest of the certified crop, at least once a year, at a minimum of 50 g/ha. Field-spray application rates in the standard are given as 50-300 g/ha for horn manure. The exact rate, water volume, stirring method and droplet size should follow the national certification body and advisor recommendations.

501: light, structure and ripening concentration

Preparation 501, horn silica, is directed more towards the aerial part of the plant, light processes, form, ripening and concentration. The Masson notes describe its use when the plants are developed and vigorous growth begins. In vineyards, which are vulnerable, fast-growing and disease-sensitive systems, repeated applications can be relevant. The notes refer to vineyards receiving three or more applications, particularly where rapid growth and humidity create high vulnerability.

A key practical window is before flowering and during early canopy development, when the vine's growth direction, tissue quality and future cluster microclimate are being established. A second important window is ripening, where 501 is associated in practice with concentration of quality, fruit expression and maturation. However, the same notes are explicit that 501 should not be applied when the plant is suffering drought stress, because of the risk of burning or worsening stress. If drought stress is uncertain, chamomile tea may be applied one or two days before 501 to help the plant recover before a silica application.

Demeter's International Standard gives a minimum of 2.5 g/ha for horn silica at least once a year, with field-spray rates of 2.5-5 g/ha. In practice, timing and plant condition are more important than simply meeting a minimum.

507 valerian for frost and stress

The Masson notes describe valerian 507 as an SOS preparation for frost risk: about 5 ml/ha, dynamised for around 20 minutes and sprayed in the evening before frost or very early in the morning. The same source notes that the effect depends on humidity and that growers may repeat evening and morning applications in high-risk periods. This is presented as biodynamic practitioner practice, not as a guaranteed frost-protection technology. Physical frost-protection measures and risk assessment remain necessary.

508 horsetail and disease-prone humidity

Horsetail, Equisetum arvense, is traditionally associated with silica and with regulation of fungal pressure in humid conditions. It is particularly relevant under high humidity and risk of downy mildew, but it is not a replacement for legal plant-protection strategy. It should be framed as a preventive and supportive measure integrated with canopy ventilation, copper/sulfur strategy where permitted, disease monitoring and weather risk models.

Valerian flower extract in glass jars during maceration.

Calendar logic: Keep it simple

The Masson notes emphasise that agronomic conditions come first. The calendar is a support to agronomy, not a substitute for it. The simplified order is: first, weather and field readiness; second, whether the operation can be placed in a favourable moon phase; third, avoidance of node periods; and only then finer details. For planting, compost application or large pruning windows, descending moon may be preferred where feasible. For disease prevention, periods before the full moon are emphasised in the notes for certain applications such as horsetail. However, the practical instruction is to avoid complexity that prevents timely work.

Preparation 500 workshop: removing mature horn manure from cow horns after excavation and checking the material before storage.

Manual dynamisation of a biodynamic field preparation in a wooden barrel before application.

Annual vineyard schedule

Practical manual application of biodynamic preparations in the vineyard.

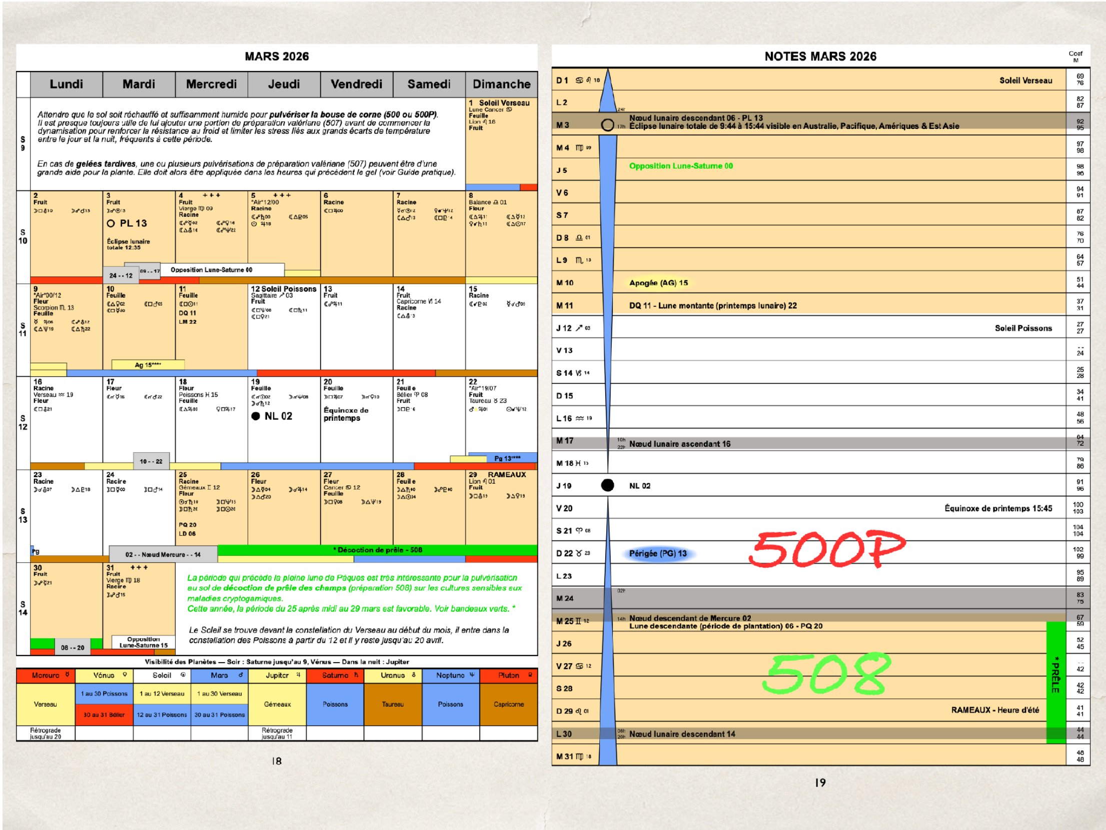
For field application quality, the spray should form clearly visible droplets rather than a very fine aerosol. In practical terms, the aim is a coarse, even spray pattern with limited drift, especially during manual application of biodynamic preparations in the vineyard.

Droplet structure during field application. The spray should form clearly visible droplets with low drift rather than an excessively fine mist.

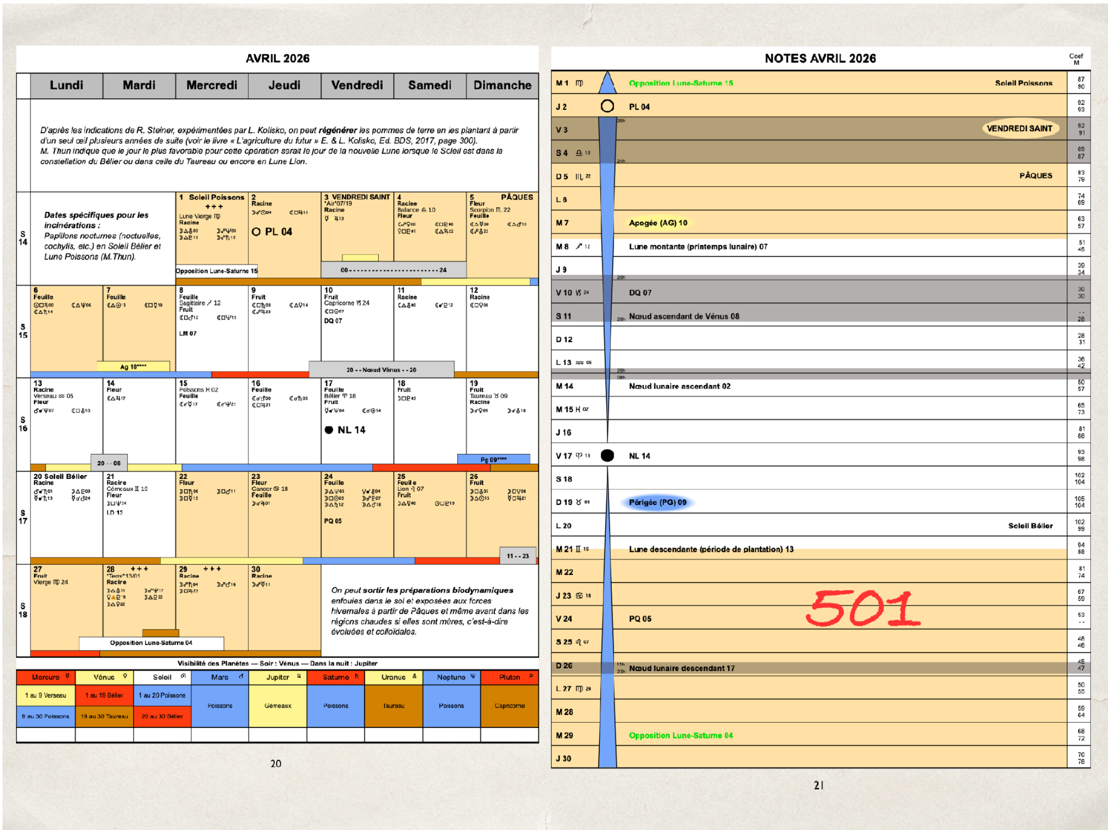
Season / stage	Main biodynamic operation	Practical note	Risk check
Late winter / pruning	Plan preparation calendar; inspect stored preparations; pruning focused on sap flow.	Do not let calendar override safe pruning weather and labour quality.	Wet conditions, wood disease blocks.
Bud burst / early spring	500P on warm, moist soil; start 508 if humid disease pressure is expected.	Soil must be biologically active; avoid cold/dry soil.	Soil temperature, soil moisture, frost risk.
Rapid shoot growth / pre-flowering	501 where vines are developed and not drought-stressed; repeat if growth is rapid and humidity high.	A key window for vine balance and tissue quality.	Drought stress, excessive heat, late frost.
Flowering to bunch closure	Support canopy balance; continue 501/508 only when plant condition justifies it.	Avoid routine spraying without observation.	Disease pressure, canopy density.
Veraison / ripening	501 only if vines are not drought-stressed; chamomile tea before 501 if stress is uncertain.	Aim at concentration and fruit quality, not forcing stressed vines.	Heat, drought, sunburn.
After harvest	500P to support organic matter transformation and post-season soil/root processes.	Especially important where residues or compost are present.	Dry soils, compacted traffic lanes.
Compost cycle	502-507 in compost, manure, deep litter or slurry.	Use correct placement and moisture management.	Anaerobic compost, contamination.

Limitations and practical discipline

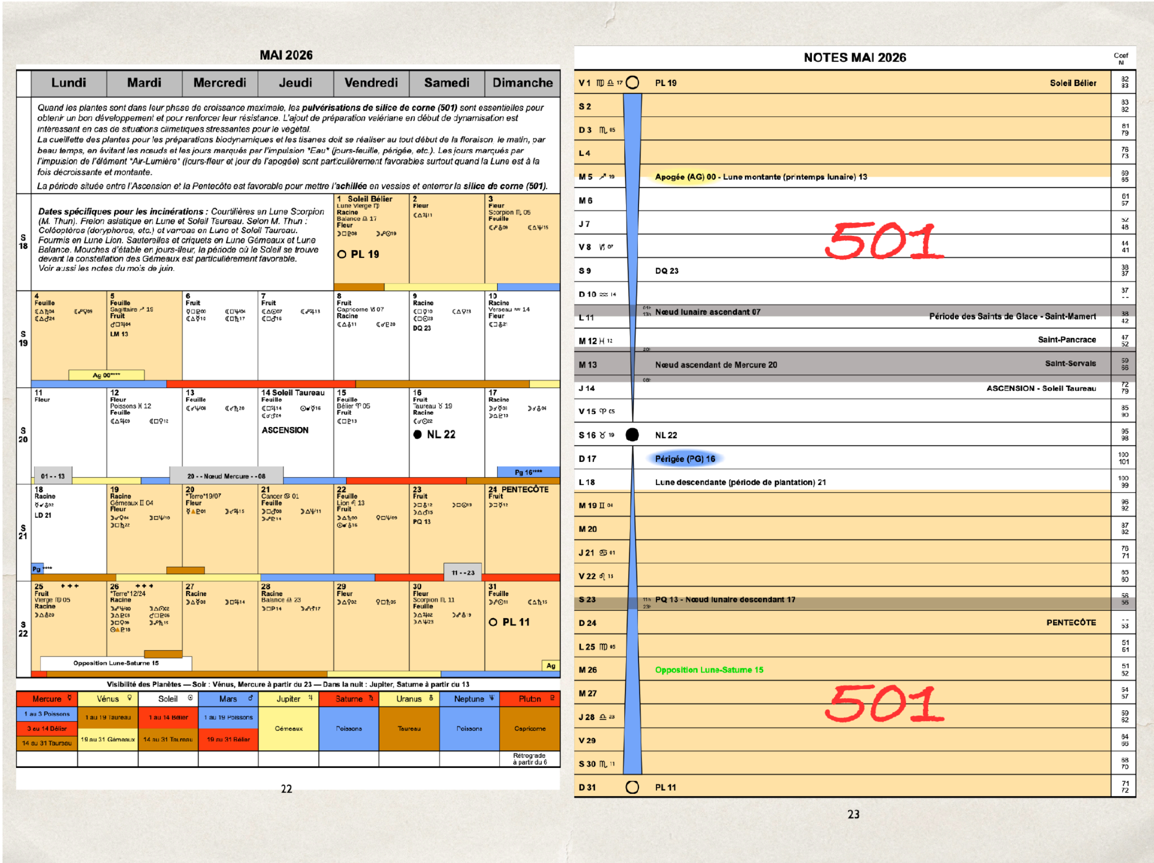
Preparations require discipline. They should be stored correctly, protected from contamination and deterioration, stirred with attention, and applied when soil, plant and weather conditions are suitable. They are not fertilisers and they do not replace pruning, canopy ventilation, plant protection, compost quality or soil management. The grower should record date, preparation, dose, water volume, stirring time, weather, plant condition and the reason for the application.



Calendar example for March showing the suggested timing of 500P and 508.



Calendar example for April showing the suggested timing of 501.



Calendar example for May showing repeated 501 timing during active growth.

Practical handling of cow horns for biodynamic preparation work. Author: Konstadinos Drakatos

Work with horns and manure as part of biodynamic training. Author: Konstadinos Drakatos

Making of the CCP preparation (Cow Pat Pit - Fladenpraeparat) as a hands-on training activity.

Sources

- *VITA project internal material. Notes from two-day lecture by Vincent Masson, BDS, 12-13 March 2025.*
- *VITA project internal material. Biodynamic winemaker's calendar, Croatia, 11 March 2026.*
- *VITA project internal material. Georg Meißner presentation: The influence of biodiversity elements and the use of biodynamic preparations in viticulture - promising new measurement possibilities, 2023/2026.*
- *Biodynamic Federation - Demeter International. International Demeter Biodynamic Standard: Production, Processing and Labelling. Current standard page: https://demeter.net/certification/standard/.*
- *Meissner, G., Athmann, M., Fritz, J., Kauer, R., Stoll, M. and Schultz, H.R. (2019). Conversion to organic and biodynamic viticultural practices: impact on soil, grapevine development and grape quality. OENO One, 53(4), 639-659. DOI: 10.20870/oeno-one.2019.53.4.2470.*
- *Fritz, J., Athmann, M., Meissner, G., Kauer, R., Geier, U., Bornhütter, R. and Schultz, H.R. (2020). Quality assessment of grape juice from integrated, organic and biodynamic viticulture using image forming methods. OENO One, 54(2), 373-391. DOI: 10.20870/oeno-one.2020.54.2.2548.*
- *Rienth, M. et al. (2023). Effects of biodynamic preparations 500 and 501 on vine and berry physiology, pedology and the soil microbiome. OENO One. URL: https://oeno-one.eu/article/view/7218.*

Measure 5 - Plant extracts, botanical preparations and compost teas

Objective	Use botanical preparations and compost teas as preventive, supportive and stress-response tools within a biodynamic vineyard health strategy.
Core actions	Prepare infusions, decoctions, macerates, tinctures or distillates from clean biodynamic/organic/wild herbs; apply valerian, nettle, willow, yarrow, chamomile, buckthorn, comfrey and compost tea according to objective and risk.
Benefits	Potential reduction of copper/sulfur dependence, improved plant resilience, stress relief after frost/hail/drought, stronger leaf tissues and more complex biological support.
Limitations / risks	Regulatory uncertainty; variable effect; water and herb quality matter; phytotoxicity risks; pyrethrum and essential oils can harm non-target organisms; compost tea hygiene and aeration must be controlled.

Basic information

Plant extracts and compost teas occupy the space between plant protection, biostimulation and biodynamic plant care. They do not replace vineyard hygiene, canopy management, resistant varieties, weather monitoring or legally permitted plant-protection products. Their main value is preventive and supportive: they help the grower intervene before a problem becomes acute, relieve stress after climatic events, and reduce the need for heavier inputs where disease pressure allows it.

Several preparation methods are relevant for botanical vineyard applications: infusion, decoction, maceration or fermentation, tincture and distillation. The quality of water and raw plant material is crucial. Ideally, herbs are harvested by the grower from clean biodynamic or organic sources, or from clean wild populations. Harvest timing, drying conditions and storage determine the quality of the resulting extract.

Because many substances have potential plant-protection effects, their legal status must be checked. Some may be considered basic substances, plant protection products, biostimulants or farm-made preparations depending on country and use claim. Botanical preparations must therefore be used only after certification and regulatory verification for the intended use.

Preparation methods

Method	Basic procedure	Typical use	Critical points
Infusion / tea	Pour hot water over fresh or dried herbs and leave to infuse. Use around 70 °C rather than boiling water for flowers and salicylic material.	Flowers, bark, delicate materials; yarrow, chamomile, willow.	Avoid destroying sensitive compounds; use good water; filter before spraying.
Decoction	Place plant material in cold water, bring to boil and simmer, sometimes up to 40-60 minutes.	Harder plant materials such as bark, roots or woody shoots.	Risk of over-concentration or phytotoxicity; cool and filter.
Maceration / ferment	Pour cold water over fresh or dried herbs and leave for several days or longer.	Fermented nettle/comfrey-type preparations; valerian petal ferment.	Can stimulate growth excessively; odour and hygiene need control.
Tincture / distillate / essential oil	Extract or distil active compounds.	Specialised plant extracts and essential oils.	Higher phytotoxicity and non-target risks; emulsification and legal status critical.

Raw material and storage

- Harvest in dry weather when the relevant plant part is at the right stage.
- Harvest the correct organ: leaf, flower, bark, root or aerial part according to the species.
- Dry in shade or darkness with good ventilation and maximum temperature around 35 °C.
- Store in cool, dry conditions in paper, cardboard or natural fibre; avoid plastic condensation.
- Use within about one year unless competent technical guidance indicates otherwise.
- Prefer rainwater or low-mineral water with slightly acidic pH where feasible.

Key botanical preparations

Plant	Preparation and dose	Main purpose	Application note	Cautions
Valerian *(Valeriana officinalis)*	Flower juice or petal ferment; 5-10 ml/ha, dynamised 10-20 min.	Anti-stress; frost support; after hail.	Spray evening before announced frost; hail use can be about 35 l/ha.	Not a guaranteed frost-protection measure; check actual frost strategy.
Stinging nettle *(Urtica dioica)*	Infusion: 100 g dried or 1 kg fresh in 5 l water; dilute to 35-50 l/ha.	Downy mildew support; plant vitality; possible Cu/S mixture.	Prefer tea over manure where excessive growth is a risk.	Ferments may overstimulate vigour.
Willow *(Salix spp.)*	Infusion: 100 g dried bark or 200 g dried shoots in 4-5 l water at about 70 °C; dilute to 35-45 l/ha.	Salicylic pathway; downy mildew, powdery mildew and botrytis prevention.	Use bark from one-year shoots before leaves appear.	Legal/certification check needed.
Yarrow *(Achillea millefolium)*	10 g dried flowers infused in 3.5 l water, diluted to 35 l/ha.	May reduce sulfur need; heat/drought stress support.	Use as gentle anti-stress support.	Effect not guaranteed; observe variety response.
Chamomile *(Matricaria chamomilla)*	10-50 g dried flowers in 3.5 l water, diluted to 35 l/ha; for drought/ripening stress 50 g/ha in >180 l/ha.	Reduction of Cu need; drought stress; support before 501 under stress uncertainty.	Masson notes recommend chamomile before 501 if drought stress is suspected.	Avoid masking serious water stress.
Buckthorn *(Rhamnus frangula)*	Bark decoction, around 120 g/ha.	Downy mildew support.	Can be mixed with meadowsweet and copper preparations where permitted.	Legal and phytotoxicity check.
Comfrey *(Symphytum officinale)*	Infusion or ferment.	Downy mildew prevention, insect repellent, nutrient/stress support.	Useful after hail and where micronutrient imbalance is suspected.	Ferment high in nitrogen; vigour risk.

Pyrethrum plant *(Tanacetum cinerariifolium)*	Pyrethrum extract.	Flavescence doree vector context.	Spray in evening because UV-sensitive.	Dangerous to beneficial insects; never spray when bees fly; strict legal control.
Citrus oils / extracts	Grapefruit extract; orange essential oil around 10 ml/ha; emulsification required.	Cryptogamic disease support; downy mildew support with KHCO3.	Essential oils are not water-soluble; need emulsification.	No sulfur for 10 days after grapefruit source note; phytotoxicity risk.

Compost tea

Compost tea is a microbial preparation based on mature, active compost and good-quality water. Its purpose is to multiply and distribute beneficial microbial activity onto soil or plant surfaces. Practical use aims at stronger root systems, more resilient plants, reduced dependence on fertiliser and plant-protection inputs, and better biological buffering after stress. Compost used for tea should be mature, clean and biologically active; rainwater or other low-mineral water is preferred where feasible.

The brewing time depends strongly on temperature and aeration. Indicative practice is about 24 hours at around 23 °C and 48 hours at around 16 °C, with additional dependence on compost microbial quality, fungal/bacterial character, nutrient amount, air volume, bubble size and whether the compost is aerated loose or in a bag. This is a technically sensitive preparation. Poorly aerated or contaminated compost tea can be agronomically useless or risky.

Regulatory and safety note

Before public use, country-specific plant-protection registration, organic input rules and Demeter/national certification requirements must be checked. The language should avoid unauthorised disease-control claims where the substance is not legally authorised for that use. Practical recipes can remain in the catalogue, but commercial recommendations must be carefully worded.

Sources

- VITA project internal material. Plant extracts and compost teas for plant protection, 2026.

- VITA project internal material. Notes from two-day lecture by Vincent Masson, BDS, 12-13 March 2025; used here for valerian 507 and nettle 504 advisory observations.

- Biodynamic Federation - Demeter International. International Demeter Biodynamic Standard: Production, Processing and Labelling. Current standard page: https://demeter.net/certification/standard/.

Measure 6 - Integration of animals in biodynamic vineyards

Objective	Move the vineyard closer to the biodynamic ideal of a farm organism by integrating animals directly or through structured cooperation.
Core actions	Use sheep, poultry, horses and, where possible, cattle as part of fertility, grazing, weed control, biodiversity and farm-identity strategy. Start with seasonal grazing and cooperation if permanent animals are not realistic.
Benefits	Nutrient cycling, manure for compost/preparations, weed control, lower mowing needs, biodiversity, structural diversity, reduced compaction with horse work, social and economic diversification.
Limitations / risks	Fencing, labour, animal welfare, predators, water supply, vine damage, wet-soil compaction, parasite management, veterinary/legal requirements, liability and compatibility with trellis height.

Basic information

Animal integration is one of the clearest differences between biodynamic viticulture as a farm organism and viticulture as a specialised crop enterprise. In theory, a biodynamic farm should include plants, animals, soil and human beings in a coherent relationship. In specialised wine regions, however, many vineyards do not own animals and may not have the land, labour or housing to introduce them immediately. The measure must therefore offer two pathways: direct integration and cooperative integration.

Livestock strengthens nutrient cycles, enhances biodiversity, deepens soil fertility and contributes to social and cultural vitality. Animals are therefore not merely a technical addition. In biodynamic thinking, they are part of the metabolic life of the farm and help transform plant material into biologically active manure.

In practical vineyard terms, animals can graze cover crops, reduce mowing, recycle nutrients, produce manure for compost, add structural diversity and create a different rhythm of observation. Sheep and poultry are often the most accessible starting point. Horses can be relevant for low-compaction work and preparation spraying. Cattle are central for manure, compost and horn manure, but they require more infrastructure and land.

Species and roles

Animal	Best vineyard role	Suitable timing	Infrastructure needs	Main risks
Sheep	Inter-row grazing, weed control, nutrient recycling, reduction of mowing.	After harvest, winter, before bud burst; selected summer grazing only with trained animals/adequate canopy height.	Mobile fencing, water, shelter, handling, predator protection.	Bark/shoot damage, overgrazing, wet-soil compaction, animal welfare.
Poultry	Mobile fertilisation, insect activity, eggs/meat diversification, avian biodiversity.	Outside high-risk disease/harvest periods; rotational mobile systems.	Mobile coops, fencing, water, predator protection.	Predators, hygiene, uneven nutrient deposition.
Horses	Low-compaction traction, inter-row work, spraying preparations, cultural value.	Where skilled horse work and suitable slopes/rows exist.	Skilled driver, horse care, equipment, safe headlands.	Labour intensity, limited speed, safety.
Cattle	Manure for compost and preparations, farm organism, landscape integration.	Often outside vineyard blocks unless trellis/infrastructure allows controlled grazing.	Land, housing, feed, water, veterinary care.	High infrastructure demand, vine damage, soil compaction if mismanaged.
Pigs	Selective soil disturbance or specific farm diversification.	Rarely directly in vineyard; more relevant in associated farm systems.	Strong fencing and management.	Severe soil disturbance, root damage, regulation.
Bees / pollinators	Support cover-crop and surrounding vegetation reproduction; strengthen biodiversity and farm identity.	Where flowering resources, water and pesticide-risk management are sufficient.	Hives or habitat, flowering resources, beekeeper cooperation, pesticide-drift protection.	Poor forage continuity, pesticide exposure from neighbours, competition with wild pollinators if poorly managed.

Permanent versus periodic presence

Permanent animal presence is appropriate only where the farm has the land, staff, housing, feed, legal capacity and economic logic to maintain animals well. It gives stronger farm-organism coherence but is demanding. Periodic grazing is the realistic first step for many vineyards. Sheep can be brought in after harvest or before bud burst by a cooperating livestock farmer. Mobile poultry can be used seasonally. Horse work can be provided by a specialised contractor. This allows a vineyard to receive some benefits without pretending that every winery can become a full livestock farm immediately.

Operational models and grazing windows

Two basic operating models are available. The first is keeping the vineyard's own sheep, which gives maximum flexibility and allows grazing to be adapted block by block, but transfers the full responsibility for health, feeding, water, fencing, daily monitoring and organisation to the winegrower. The second is cooperation with shepherds or neighbouring livestock farms. This reduces the workload and can be a low-barrier entry point, especially for winter grazing, but gives the winegrower less control over timing and animal behaviour.

Timing is the key risk-control tool. Sheep should be excluded during the two critical browsing windows: budbreak and early shoot growth in spring, and the period from the onset of ripening until harvest. Outside these windows, grazing can be used for winter vegetation control, summer grazing in selected blocks, or targeted defoliation/leaf removal only where vine training, animal behaviour and supervision make it safe.

Implementation plan

1. Assess vineyard suitability: row width, trellis height, young vines, trunk guards, slope, access, water, predator pressure and legal restrictions.
2. Define the animal objective: mowing reduction, manure, biodiversity, marketing/education, traction, fertility cooperation or farm diversification.
3. Start with one block and one season. Avoid whole-farm deployment before animal behaviour and vine response are known.
4. Use mobile electric fencing to control grazing intensity and protect sensitive zones.
5. Never graze wet soils when trampling would cause compaction. Trampling can support soil contact and structure only when managed; it damages soil when excessive or wet.
6. Monitor animal welfare daily: feed supply, water, shade, fencing, health, parasites and predator risk.
7. Record effects: mowing reduction, vegetation height, bare soil percentage, manure distribution, vine damage, labour, cost and biodiversity observations.
8. Review whether permanent integration, seasonal grazing or cooperation is the right model after the first year.

Case examples and observations

Integration of animals into the vineyard system.

The Seresin Estate example illustrates how animal integration can become part of the whole vineyard system: variable row widths and trellis heights, robust infrastructure, permanent grass cover or rotational crops, mobile poultry systems, sheep grazing, Jersey cows, horse-drawn preparation spraying and poultry integration. The cited case also reports intensive winter grazing with approximately 300 lambs on 5 ha; this should be read as a site-specific example rather than a general stocking-rate recommendation.

Practical examples from biodynamic estates such as Alois Lageder show the type of responses growers monitor after animal integration: looser grape structure, fewer lateral shoots, stronger lignification of vine branches and cover crop, increased biodiversity, earlier leaf fall and possible effects on pest dynamics such as *Drosophila suzukii*. These observations should always be interpreted through the specific site, season and grazing system.

Benefits

- Direct recycling of vineyard biomass into manure and biological fertility.
- Reduced mechanical mowing and potentially lower fuel use.
- More varied vegetation structure and habitat for insects and soil organisms.
- Manure sources for biodynamic compost and preparations.
- Social and educational value: animals make the farm organism visible to visitors and workers.
- Potential economic diversification through meat, eggs, dairy or cooperation with local farms.

Limitations and questions before implementation

- Can the vineyard provide water, shade and secure fencing?
- Are trunks, young vines and drip lines protected from damage?
- Can grazing be stopped immediately if soil becomes wet or vines are at risk?
- Who is legally and practically responsible for animal welfare?
- Does the farm have veterinary support, parasite management and predator strategy?
- Is manure distribution agronomically useful or too uneven?
- Can animals be integrated without compromising harvest hygiene and visitor safety?

Poultry integrated into the vineyard for pest control and nutrient cycling.

Winter grazing by sheep in a vineyard outside the sensitive growth period.

Sheep grazing in a perennial fruit area with diverse ground vegetation.

Supplementary feeding and controlled animal presence within a vineyard system.

Temporary fencing used to manage sheep movement and protect the crop.

Sources

- *VITA project internal material. Biodynamic viticulture and livestock integration, 2026.*
- *VITA project internal material. Livestock in the Vineyard: Practical Examples, Opportunities, and Prospects for Winemakers, 2026.*
- *VITA project internal material. Integration of Animals in a Biodynamic Vineyard, 2026.*
- *Biodynamic Federation - Demeter International. International Demeter Biodynamic Standard: Production, Processing and Labelling. Current standard page: https://demeter.net/certification/standard/.*
- *LIFE VineAdapt. Sustainable Viticulture for Climate Change Adaptation. URL: https://www.life-vineadapt.eu/en/projekt.html.*

Measure 7 - Biodiversity and landscape structures

Objective	Increase functional biodiversity and landscape coherence around vineyards while maintaining viticultural hygiene, airflow and operational practicality.
Core actions	Develop hedgerows, flowering strips, species-rich inter-rows, trees where appropriate, dry structures, nesting sites, water elements, buffer zones and habitat corridors. Connect them with cover crop and animal strategies.
Benefits	Pest regulation, pollinator and beneficial-insect habitat, microclimate moderation, erosion control, landscape identity, ecological resilience and social value.
Limitations / risks	Poorly placed elements may shade vines, obstruct airflow, harbour problem species or complicate machinery; maintenance is needed; benefits depend on landscape context.

Basic information

Biodiversity in biodynamic viticulture is not a decorative strip at the vineyard edge. It is part of the vineyard organism and should provide functional services: pest regulation, soil life, pollinator support, microclimate buffering, erosion control and landscape coherence. The LIFE VineAdapt project demonstrated climate-adapted biodiversity vineyard management across several European wine-growing regions and focused on ecosystem services such as pest control, soil biota, humification, erosion protection, water retention and greenhouse-gas reduction. These functions provide the practical basis for biodiversity design in the vineyard.

Implementation options

- Species-rich inter-row covers with staggered flowering and rooting depths.
- Permanent or temporary flowering strips at headlands, margins or non-traffic alleys.
- Hedgerows using native shrubs and trees, positioned to avoid shading and airflow problems.
- Dry-stone walls, wood piles, beetle banks and other small structures for beneficial organisms.
- Trees or agroforestry elements only where they do not create excessive competition, shading or mechanisation barriers.
- Nest boxes, perches and bat boxes where compatible with conservation and farm objectives.
- Wet or water-retention elements where hydrology and disease-risk considerations allow it.
- Buffer zones next to neighbouring conventional land, roads or erosion pathways.

Design principles

Young trees integrated into the vineyard as part of biodiversity infrastructure and climate buffering.

Tree lines and edge structures adjacent to vineyards can strengthen ecological connectivity and landscape resilience.

Pollinators supporting biodiversity in and around the vineyard.

Beehives near vineyard plots contributing to habitat diversity and pollination of associated flora.

Biodiversity measures should be designed at landscape scale. A vineyard surrounded by forest, grassland and hedges needs a different strategy from a vineyard in a simplified agricultural matrix. The priority is to connect habitats and provide continuity of food, shelter and overwintering sites. The vineyard should not be managed as a sealed block. Edges, headlands, terraces, drainage lines and steep unproductive corners are often the best starting points.

Limitations

Not every biodiversity element is beneficial in every position. Dense hedges placed too close to rows can reduce air movement and increase humidity. Tall trees can compete for water or shade vines. Flowering strips can fail if soil preparation or species choice is poor. Biodiversity elements also require maintenance. The design should therefore be site-specific, functional and reviewed regularly against vine health, airflow, water competition, machinery access and observed biodiversity response.

Sources

- LIFE VineAdapt. Sustainable Viticulture for Climate Change Adaptation. Project information. URL: https://www.life-vineadapt.eu/en/projekt.html. - VITA project internal photo material. Biodiversity and landscape examples used in this chapter, 2026.

- European Commission LIFE Public Database. LIFE19 CCA/DE/001224 - Sustainable Viticulture for Climate Change Adaptation. URL: https://webgate.ec.europa.eu/life/publicWebsite/project/LIFE19-CCA-DE-001224/sustainable-viticulture-for-climate-change-adaptation. - FiBL. Use of functional agro-biodiversity to improve ecosystem services in vineyards. Project 1402, 2018-2021. URL: https://www.fibl.org/en/themes/projectdatabase/projectitem/project/1402.
- Pfiffner, L. and Stöckli, S. (2023). Organic Agriculture and Biodiversity: Impacts of different farming systems on biodiversity. FiBL fact sheet no. 1548, 2nd edition. DOI: 10.5281/zenodo.7743951. URL: https://www.fibl.org/en/shop-en/1548-biodiversity.

Measure 8 - Biodiversity infrastructure and climate buffering

Objective	Design biodiversity as functional vineyard infrastructure that improves microclimate buffering, soil integrity, pest regulation, water retention and long-term production resilience.
Core actions	Diagnose ecological deficits, reduce bare-soil periods, maintain diverse inter-row vegetation, protect mycorrhizal networks, build flowering and woody habitats, install bird and beneficial-organism infrastructure, and connect vineyard blocks with surrounding landscape elements.
Benefits	Greater climate resilience, reduced erosion and evaporation, better soil biological activity, more beneficial insects and birds, improved humus formation, lower dependence on reactive plant-protection interventions and a more coherent vineyard organism.
Limitations / risks	Poorly positioned hedges or trees can create shading, humidity or machinery problems; living cover can compete for water; habitat elements require maintenance; and biodiversity measures must be adapted to local climate, slope, frost risk and production goals.

Basic information

Biodiversity is not a separate decorative element added after vineyard management has been planned. In biodynamic viticulture it is part of the vineyard organism itself. The practical question is whether the vineyard contains enough living structures to buffer wind, heat, water stress, erosion and pest pressure while supporting soil life and grape quality.

In Central Europe this question has a specific historical background. Large-scale mechanisation, black fallow, herbicide-based soil management, removal of hedgerows and tree lines, and the simplification of agricultural landscapes weakened natural regulation mechanisms. Vineyards managed as clean monocultures often lose root diversity, habitat continuity, mycorrhizal support and microclimate stability.

The purpose of this measure is to rebuild biodiversity as functional infrastructure: living soil cover, plant mosaics, trees, shrubs, beneficial-organism habitats, bird perches, nesting structures and connected landscape elements that help the vineyard become more self-regulating.

Measure objective

The objective is to move from isolated biodiversity elements to an integrated vineyard design. A biodynamic vineyard should not only contain flowers or trees; it should use biodiversity to support specific agronomic functions: water retention, humus building, protection against wind and heat, habitat for beneficial insects and birds, and reduction of the biological fragility created by simplified landscapes.

Field implementation

1. Diagnose the starting point. Map bare soil, compacted alleys, erosion paths, frost pockets, wind exposure, simplified margins, missing flowering periods, absence of trees or shrubs, and areas where beneficial organisms lack shelter or overwintering habitat.
2. Replace black fallow with living or mulched soil wherever feasible. Continuous bare soil increases erosion, heat stress and loss of soil biological activity. In dry areas, the solution is not unmanaged competition, but carefully timed covers, crimped vegetation, mulch or alternate-row strategies.
3. Protect soil fungal networks. Avoid unnecessary deep ploughing where soil structure and weed pressure allow a transition to reduced tillage, direct seeding or mulch-based systems. Arbuscular mycorrhizal fungi contribute to nutrient uptake, root exploration and soil aggregation, but they are damaged by repeated heavy soil disturbance.
4. Use plant mosaics rather than single-purpose vegetation. Combine grasses, legumes, flowering herbs and spontaneous vegetation where suitable. The objective is staggered flowering, different rooting depths, habitat continuity and manageable competition with vines.
5. Build habitat infrastructure for allies. Bird perches, nesting boxes, bat boxes, wood piles, dry-stone elements, beetle banks and flowering strips can support predators and beneficial insects. The aim is not to eliminate all pest pressure, but to rebuild natural regulation capacity.
6. Reintroduce woody elements strategically. Shelterbelts, hedgerows, individual trees and agroforestry elements can reduce wind speed, evaporation, heat stress and erosion. They must be positioned so that they do not create excessive shading, humidity, root competition or machinery constraints.
7. Link biodiversity with vineyard operations. Mowing, rolling, crimping, grazing, plant-protection timing and canopy management should be planned so that biodiversity measures do not conflict with disease prevention, harvest access or water balance.

Design principles

Biodiversity design should begin with function. A vineyard in an open, windy and erosion-prone landscape needs different structures from a vineyard surrounded by forest and permanent grassland. In simplified landscapes, the first priorities are often habitat continuity, flowering resources, woody buffers and soil cover. In more complex landscapes, the focus may shift to maintenance, avoiding excessive humidity and connecting existing habitats.

Trees and hedgerows require careful placement. Their value comes from microclimate buffering, habitat provision and landscape coherence, but poor placement may increase

shade, reduce airflow or make mechanical operations difficult. Biodiversity must therefore be designed with the same technical seriousness as trellising, pruning or plant protection.
Cover vegetation should be managed as a living tool. Crimping, mowing, grazing and mulching create different outcomes. Crimped vegetation can reduce soil temperature, lower evapotranspiration and create protective mulch, while repeated short mowing may weaken flowering resources and soil cover. The choice depends on water availability, disease pressure, species composition and machinery.

Benefits

Biodiversity infrastructure can strengthen pest regulation by supporting birds, predatory insects, parasitoids and other beneficial organisms. It can improve water retention through permanent roots, mulch and better soil aggregation. It can reduce erosion by keeping the surface covered and slowing runoff. Woody structures can buffer wind and heat and create a more stable microclimate.
For biodynamic viticulture, these benefits are not only ecological. They support the coherence of the farm organism. Soil cover, trees, animals, compost, preparations and human management become more effective when the vineyard is embedded in a living landscape rather than isolated as a bare production block.

Limitations and risk management

Biodiversity measures can fail when they are treated as symbolic additions. A flower strip without correct establishment, maintenance and water consideration may disappear or become dominated by competitive weeds. A hedge in the wrong place may increase humidity around the canopy. Trees planted without regard to root competition and machinery may create operational problems.
The correct approach is staged implementation. Start with diagnosis, then use small but coherent interventions: one connected flowering corridor, one improved headland, one shelterbelt section, one nesting-box plan, or one block converted to reduced tillage and living mulch. Monitor results before scaling up. Biodiversity is a long-term infrastructure investment, not a one-season input.

Monitoring indicators

- Percentage of vineyard soil covered during vulnerable rainfall and heat periods.
- Number and continuity of flowering windows from spring to autumn.
- Presence of beneficial insects, birds, bats or predator signs.
- Visible erosion, runoff paths and soil crusting after heavy rain.
- Soil structure, rooting depth, earthworm activity and smell from spade diagnosis.
- Canopy humidity, disease pressure and airflow near hedges, trees or tall vegetation.
- Maintenance needs, machinery access and water competition around biodiversity elements.

Sources

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Measure 9 - Cooperation, professional groups and regional actors

Objective	Use cooperation to solve bottlenecks that an individual vineyard cannot solve alone: animals, manure, machinery, expertise, preparation production, composting and advisory learning.
Core actions	Create win-win agreements for grazing, manure/fodder exchange, shared compost, shared machinery, preparation spraying, expert groups and regional biodynamic networks.
Benefits	Lower cost, better access to animals/manure, shared risk, faster learning, stronger local food/farm identity and better continuity after the project.
Limitations / risks	Requires trust, clear responsibility, contracts, insurance, timing coordination and compatible certification rules.

Basic information

Many winegrowers cannot immediately own animals, produce all manure, buy all specialised machinery or master every biodynamic technique. Cooperation is therefore not secondary. It is a core implementation measure. The VITA guideline explicitly mentions win-win cooperation, for example grazing animals in vineyards and sharing machinery. In Central and Eastern Europe this is particularly relevant because vineyard structures, land fragmentation and labour availability often make individual solutions inefficient.

Cooperation models

- Grazing contract with a sheep farmer after harvest or before bud burst.
- Exchange of vineyard biomass or fodder for manure or compost.
- Shared composting site between vineyards and livestock farms.
- Shared preparation equipment and application service for small vineyards.
- Machinery groups for rollers, seeders, compost spreaders, under-vine tools and low-compaction equipment.
- Regional professional group with seasonal field walks before key operations: pruning, 500P, 501, plant extracts, compost turning and grazing.
- Joint biodiversity planning across adjacent vineyards so habitat corridors are connected rather than isolated.
- Shared communication and education events for consumers, restaurants and local authorities.

Professional groups and peer-to-peer learning

Practical viticulture training in a workshop setting.

Peer-to-peer learning in the vineyard during a practical course.

Indoor training and expert exchange within the VITA learning process.

Professional groups add a cooperation layer that is not limited to contracts or machinery. In biodynamic viticulture, many decisive skills are practical and observational: preparation making, timing, composting, animal integration, landscape design, pruning judgement and adaptation to terroir. These skills are transferred effectively through vineyard walks, seasonal workshops, tasting groups and informal grower circles.

- Use regional groups for fast problem-solving during disease pressure, drought, frost, soil imbalance or conversion difficulties.
- Organise collective field observations: one block, one problem, one season, documented repeatedly by several growers.
- Compare different cover-crop mixtures, preparation timing, compost strategies or pruning decisions across sites rather than treating one farm as universal proof.
- Use peer groups for certification readiness: documentation habits, inspection preparation, input checks and interpretation of changing standards.
- Build cross-border links in Central and Eastern Europe where biodynamic viticulture is still developing and practical experience is unevenly distributed.

Governance

Every cooperation needs clarity. Who owns the animals, who checks fences, who pays for damage, who supplies water, who decides when grazing stops, who records certification documentation, and who is responsible for worker safety? Informal trust is valuable, but repeated cooperation should be written down. For certification, traceability of manure, compost and inputs is essential.

Farm visit and exchange on livestock integration and wider farm-system design.

Field discussion on vineyard management and practical equipment choices.

Peer learning around cover crops, soil cover and practical vineyard observations.

Structured group discussion as part of regional biodynamic knowledge exchange.

Sources

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- *Biodynamic Federation - Demeter International. International Demeter Biodynamic Standard: Production, Processing and Labelling. Current standard page: https://demeter.net/certification/standard/.*
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3. Short note on winemaking

Objective	Ensure that cellar work preserves, rather than obscures, the quality created through biodynamic vineyard management.
Core actions	Keep intervention proportionate; maintain traceability; comply with Demeter/national rules; link harvest decisions with grape health, ripeness and nitrogen status.
Benefits	Better coherence between vineyard and wine; clearer identity; reduced need for corrective winemaking.
Limitations / risks	A catalogue of viticulture measures cannot replace a technical winemaking manual. Regional wine law and Demeter processing rules must be checked.

Basic note

Biodynamic winemaking begins in the vineyard. The cellar cannot compensate for poor grapes, weak canopy management, disease-damaged fruit, excessive vigour or badly timed harvest. Conversely, careful cellar work should preserve the quality, rhythm and site expression built through soil, plant and farm-management measures.

Demeter's wine standard gives the processing framework. Growers should consult the national certification body for permitted additives, processing aids, filtration, sulfur limits, packaging and labelling. In practical advisory language, the cellar should use the minimum intervention needed to produce a stable and truthful wine.

Vincent Masson mentions a practical link between vineyard preparation work and fermentation: where fermentation problems are linked to lack of nitrogen, nettle preparation 504 is discussed as a possible support around fruit set and veraison.

Ripe grapes in the vineyard. Biodynamic winemaking begins with fruit quality established before harvest.

Sources

- Biodynamic Federation - Demeter International. International Demeter Biodynamic Standard: Production, Processing and Labelling; section Wine and sparkling wine. Current standard page: https://demeter.net/certification/standard/.

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- VITA project internal material. Notes from two-day lecture by Vincent Masson, BDS, 12-13 March 2025; used for advisory note on nettle 504 and weak fermentation nitrogen.

4. Implementation timeline and checklist

Seasonal checklist for a biodynamic vineyard plan

Period	Main decisions	Catalogue measures involved
Winter	Pruning architecture, tool hygiene, compost planning, animal/grazing agreements, machinery planning.	Pruning; fertility; cooperation; animals.
Early spring	Soil condition, 500P timing, cover crop assessment, frost strategy, first plant extracts.	Preparations; cover crops; plant extracts.
Rapid growth	Shoot selection, canopy ventilation, 501 timing, disease prevention, traffic discipline.	Canopy; preparations; plant extracts; traffic management.
Flowering to bunch closure	Canopy density, disease risk, cover crop suppression, biodiversity flowering windows.	Canopy; cover crops; biodiversity.
Veraison to harvest	Water stress, fruit exposure, 501 only if vines are not drought-stressed, harvest quality.	Preparations; canopy; winemaking link.
After harvest	Grazing, compost application, 500P, soil cover repair, erosion review.	Animals; fertility; preparations; cover crops.
Autumn	Cover crop sowing, compost preparation, biodiversity planting, cooperation agreements for next year.	Cover crops; fertility; biodiversity; cooperation.

Minimum farm-level monitoring

- Annual photographs from fixed points in each block.
- Simple soil observations: spade test, aggregate stability, earthworms, smell and rooting depth.
- Pruning weight and crop load records.
- Disease pressure and plant-protection interventions.
- Biodiversity infrastructure map, flowering windows and annual habitat observations.
- Cover crop species and termination dates.
- Preparation dates, weather, plant condition and application method.
- Animal grazing dates, stocking density, damage records and manure distribution.
- Compost source, recipe, preparation date, maturity and application rate.

Sources

- Biodynamic Federation - Demeter International. International Demeter Biodynamic Standard: Production, Processing and Labelling. Current standard page: https://demeter.net/certification/standard/.

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