BIODYNAMICS FOR VITICULTURE

by Cheryl Kemp

Awards for excellence are being received by Biodynamic Viticulturists in Australia and New Zealand, demonstrating flavour and quality can be achieved using environmentally safe and sustainable growing methods.

Biodynamic practices empower viticulturists to combine their own individuality and intentions with the unique qualities of the soils they have selected as their culinary canvass to produce interesting and outstanding wines.

Biodynamics allows the growing community of individuals, both growers and consumers, who seek relief from the regimented sameness of the mass market, often achieved at great expense to both individual and environment, to find food and wines that combine the satisfaction of good eating with positive environmental outcomes. Continual Biodynamic farming practices also develop greater reserves of humus in the soil with increased vitality and water holding capacity.

In a culture where wine is regarded as the epitome of taste and culture it is encouraging to see so many biodynamic wines achieving recognition. It may be that the renewal of our environment will become a question of community taste.

The Vineyard

Site selection will be the most significant reflection of the individuality and intention of the viticulturist, closely followed by the grape varieties chosen to practices her/his personal alchemy. Once this process has been resolved the next task is the preparation for planting.

Experience shows that time spent preparing the soil before planting ensures strong healthy vines capable of good production and less prone to disease. Withholding the urge to rush out and plant until the soil has been prepared and enlivened can be a challenge but can also result in the satisfaction of seeing your vines soon catch up with those with less patient guardians.

Where you are taking over an existing vineyard it is a matter of establishing sound Biodynamic practices without delay.

Start with spraying out the full sequence of Biodynamic sprays to establish strong biological activity, develop soil structure and humus which also improves water-holding capacity. (Refer Table 1).

See article Biodynamic Preparations –the foundation of Biodynamic Practice. Town and Country Farmer, Vol.20 No.3 Spring 2003.

A green manure crop that suits your area and season will give lots of green material to provide nutrition and organic matter when turned in at early flowering. Forage sorghum, broad beans, millet or oats and lupins are ideal.

When turning in, spray with the Biodynamic Manure Concentrate to assist breakdown of the green material. If you can repeat this green manuring before planting you will benefit.

Soil Tests

Use Soil testing laboratories that offer Albrecht soil tests, such as the Brookside Laboratories (via Nutri-Tech, or private Consultants), Swep Laboratories in Victoria or Perry Laboratories in SA. Check that your Calcium:Magnesium ratio is in balance and other major nutrients are present. You may need to apply calcium or magnesium to establish the balance.

We find with Biodynamics that once you have the major nutrients present and in balance and your organic matter increases, the Biodynamic preparations stimulate the bacterial and fungal activity that bring in all the trace elements that are required for your specific area. We also find that when using the Biodynamic Preparations much smaller amounts of recommended mineral inputs, such as calcium, are required as the biological activity the Preparations stimulate makes the substances more readily available to the plants.

Biodynamic practitioners also find the application of basalt dust to the area (at the rate of 1-2 tonnes per Ha) is also very beneficial, bringing in rock enzymes, trace elements and paramagnetic qualities to your land.

Applications of compost to the whole area at the rate of 2-5 tonnes per hectare also helps strongly establish all these activities in your soil. (See Compost making later.)

When all is ready, deep ripping along the rows ensures the easy rooting for vines and better aeration of the soil.

Sward Management

You need to establish a sward or grasses between the rows. A mixture of herbs, grasses and legumes provides variety for soil nutrition and life.

The plants in the sward perform many duties. The deep taprooted varieties can access deeper nutrients, mulch mowing provides organic matter and food for the earthworms, plus it can be thrown over the undervine areas to form a cover or weedmat. The legumes in the mix bring extra nitrogen and support the calcium processes in the soil. The sward can also provide a habitat for beneficial insects such as predatory mites and wasps, ladybirds, lacewings, hoverflies and tachnid flies. These all contribute to managing your vine parasites.

Use deep tap rooted plants such as chicory, Queen Anne's Lace, dandelions and lucerne. Mix these with some grasses such as rye, oats, prairie grass, native grasses and legumes such as lupins, red and white clovers. Other varieties of herbs can also be used such as alyssum, dill, caraway, coriander, buckwheat and basil. You need to make sure you do not choose a climbing type that will soon use your vines to lift them higher in the world. [1]

Undervine Management

Vines, according to Dr. Elaine Ingham, the Soil Food Web Scientist and Microbiologist, Oregon USA, require more fungi than bacteria in the soil (a ratio of 2-5 fungi : 1 bacteria), whereas grasses like more bacteria than fungi in their soil.

By changing the compost or mulch on the surface of the undervine area, we can change the fungal bacterial ratio and keep

Julian Castagna, of Castagna Vineyard, Beechworth, Vic says:

Biodynamics for me is not a method of selling a product; it is a method of growing a product. The Biodynamic method was a sacred gift to the world by Rudolf Steiner and, if followed, will enrich our spirit as well as nourishing our bodies. It is the best way I know of allowing the land to speak through the product it grows. But, biodynamics is not a magic potion, it is not an excuse for lazy farming and although it will certainly help enliven any land to which its methods are applied, it will not produce great flavour where the potential for flavour is not present in the soil.

Our biodynamics is based almost entirely on what we have come to consider is the proper use of the preparations which we use many more times per year than is usually recommended; we use all the preparations not just 500. We make up and have available for use all year round teas of fish, seaweed, humic acid, nettle and worm juice (others also if needed). All these are fermented together with preparation 502 to 508. These teas are used in their own right but are also added to whatever else may be required as disease control in the vineyard, this of course is totally weather dependent. For example whenever we spray copper and sulphur for the control of powdery or downy mildew we add a litre or two of each of our teas to the spray tank and these are applied together with the copper and sulphur.

We apply 500 and 501 at least four times each year, but sometimes replacing the 501 with 505 depending on the weather. Sometimes if the atmosphere is too dry we might apply 500 to bring in more moisture. We apply something, at each Moon opposition Saturn, often Equisetum. We have found that observation is the key, and the preparations, the tools, we always work with the planting calendar but are never constrained by it.

Note: (Moon opposition Saturn is a specific time occurring each month when fertility and strength of form are enhanced by this planetary position. Biodynamic farmers work with the Antipodean Astro calendar to identify these times.

TABLE 1 **SUGGESTED BIODYNAMIC SPRAY PROGRAM FOR VITICULTURE**

Activity	Type of Biodynamic Preparation	Rate Per Ha	Stirring	Application	Times of Application	Cost/Ha (incl.GST)
Soil preparation prior to planting vines:	Apply Combined soil preparation to green manure crops in area planned for vineyard when discing in.	175g	1 hour flowforms or stirring machine	Soil spray droplets 35 lt. per ha	Moon descending or Moon opposition Saturn Afternoon	$7.92
	Apply Basalt rock dust and lime or soil amendments as required and deep rip rows to plant vines in.	1-2 tonnes		Spreader	Soil preparation And thereafter via compost	Check local prices
Apply this sequence monthly to Vines August to December each year						
SOIL SPRAY Apply to soil in rows between vines	Combined Soil Spray -containing Horn Manure Manure Concentrate - Winter Horn Clay 508 - fermented 8 x potency	175g	1 hour flowforms or stirring machine	Soil spray droplets 35 lt. per ha	Moon descending or Moon opposition Saturn Afternoon	$7.92
Next am ATMOSPHERIC SPRAY	Horn Silica 501 Summer Horn Clay 508 - fresh 8 x potency	2g 10g 1 vial per tank	1 hour flowforms	Air spray Mist	Sunrise Day after soil spray	$7.00
January to Harvest each year- To keep sugar sap levels up to prevent and strengthen against fungal disease and mildews.						
Atmospheric Sprays	Horn Silica 501 Summer Horn Clay 508 – fresh 8 x potency	2g 10g 1 vial per tank	1 hour flowforms	Air spray Mist	Moon opposition Saturn each month. Sunrise or sunset	$7.00
Apply monthly During growth period - Spring to Harvest.	Fish Emulsion or seaweed	2 –4 ltrs/ha	20 minutes flowforms	Foliar spray a.m. or afternoon	Monthly 2-4 days up to full moon	$2.50 per/ha @ 2ltrs/per/ha
Prior to harvest extra to lift Baume or Brix.	Horn Silica 501 508 – fresh 8x (if damp)	2g 1 vial per stir	1 hour flowforms	Sunrise Only need to do boundaries of each block	Ascending Moon	$4.00 per/h
Post harvest Spray to assist leaves to take nutrients to soil for winter	Horn Silica 501	2g	1 hour flowforms	Sunrise	Descending moon	$3.30 per Ha
Compost: apply 2 x per year – spring and autumn. See Resource Manual for instructions	Make up using the Biodynamic Compost Preparations 502-508			1-2 shovelfuls per vine or 4-5 tonnes per Ha.	Spread in inter-rows in autumn or under trees and then mulch in spring.	Compost Preparations $11 per 3 cu Metres
Tree Pasting	Tree Paste: Cow manure, Diatamaceous earth Bentonite Horn manure 500	4 parts 2 parts 3 parts 25g	Mix till sloppy And either paint on or spray thinner solution	Cover trunk and over pruning cuts	At pruning (descending moon) or over winter	Horn Manure 500 15g per Ha $1.65

Estimated Cost of Biodynamic Preparations for the Vineyard per Ha.

Combined Soil Preparation $8.00 per Ha x 5 app. $40
Atmospheric Sprays (501, S Horn Clay, 508) $7.00 per Ha x 9app $63
Fish Emulsion/Seaweed tea $2.50 per Ha x 8 app $20
Compost Preparations for Compost heap $ 13 per Ha per annum $13
Tree Paste $5 per Ha per annum $5
Total per Ha per annum for Biodynamic Preparations $141

Undervine management at Cullen Vineyards, Cowaramup Margaret River. Using undervine weeder to clear under vines means no need for herbicides.

most grass type weeds out of the undervine area. This can be achieved using a highly fungal compost with a higher woody content such as stems, cuttings, skins and seeds (mark), wood chip or mulching hay.

Another way is to grow low growing herbs under the vines, such as Thymes, Lavenders, Oregano, Parsley etc. Think of the wonderful aromas that will arise to your flowering grapes to enhance the flavours! This approach could also provide a supplementary crop for market.

Each area or state has its own vineyard mythology on undervine management. Victorian grape growers like to keep the earth bare allowing the reflected heat of the sun to ripen the fruit. They also feel that mulch will attract frost, which is seen as detrimental. (The French grapes manage under snow - …but maybe they grow different varieties?)

In Western Australia's Margaret River area, mulching and composting under the vines and including undervine herbs once the vine is established is achieving award winning success. Margaret River has only winter rains and so weeds over summer are not an issue. They also don't get frosts… It may be the climatic conditions that really determine undervine management requirements.

In the Barossa Valley, where they also receive only winter rains, Biodynamic viticulturists are trialing undervine cover. Whichever undervine management you choose, there is agreement that in the early developmental stages for young vines, it is seen as important to keep the undervine areas cleared.

If you are taking over an existing vineyard and are not able to establish a good, clean environment to plant into, this is best achieved with undervine weeders that cut just under the soil and usually have a chain flail to clear the surface. If you choose to use Glyphosate in the early stages to deter intractable weeds, mix it 1:10 with some Biodynamic Manure Concentrate to overcome the damage the Glyphosate does to the soil food web. (Beware of using Glyphosate if you are wanting to get Organic Certification.)

Note: Glyphosate will kill out the pseudomonas bacteria, which protect your vines against phytophthora! [2]Bruce Tainio[3]

Irrigation

Biodynamic soils retain water in the humus and well structured, aerated environment. The Biodynamic plants also develop extensive rooting systems accessing deeper water sources.

Biodynamic Viticulturists have found that they use 50-75% less water than neighbours with the bonus of a better tasting crop! Dryland viticulture works for many Biodynamic Viticulturists, depending on location and personal choice.

Fungal Disease – Prevention

Fungal disease happens when a number of climatic and plant health stresses coincide. Plant health is improved immeasurably by using the Biodynamic Preparations and sprays. Through keeping the sugar saps up and the sap pH at 6.4 the plant does not attract insects.

Bruce Tainio, Microbiologist and Agricultural Consultant in Washington, USA, has found that if the sap pH is higher than 6.4 the plant is susceptible to insect attack. A low, more acidic sap pH, will see disease ensue.

Fungal diseases also occur when the moisture and warmth levels are up. Biodynamic Viticulturists watch the weather and also use the Antipodean Astro Calendar to alert them to potential climatic problems ahead. For instance, when there is a Full Moon and Moon Perigee,[4] (which is when the Moon is closer to the earth) they know and can prepare for increased risk of fungal activity. Under these circumstances the Earth is over-endowed with watery forces, and by regularly using the Compost preparations and the Horn Silica sprays and Equisetum or Casuarina spray (which balances watery forces) it is possible to strengthen the plant against this possibility of fungal disease. The Horn Silica also keeps the sugar sap levels up in times of stress, so the plant is strong enough to withstand the adverse conditions.

Milk or whey is used to protect against Powdery Mildew with great success. Trials by Peter Crisp,[5] et al, found that in comparison with other organic type sprays, the Lactoferrin in whey and milk causes the hyphae of the Unicinula necator to collapse within 24 hours. This is a potential replacement for sulphur sprays in the vineyard.

Use of the Manure Concentrate, Seaweed or Fish Emulsion sprays can also keep the beneficial fungi and bacteria up to high levels on the vine leaves, preventing infestation of non-beneficial, pathogenic fungi and bacteria. (These sprays are similar to the Compost teas that Dr. Elaine Ingham has found to be of great benefit for disease control.)

Composting

Compost is best made on farm and applied annually. Biodynamic Viticulturists recycle grape mark and prunings through their composts. Having your own cow or cattle grazing for their influence and manure is the ideal situation.

James Millton, Gold medal Biodynamic Viticulturist from Gisborne, NZ, stated that he had put off having cows and making compost for years. He now admits that once he finally did it, he was amazed by the improvement in the whole farm integrity.

Recycling the farm waste back via compost facilitates developing the right microorganisms for your particular vineyard, growing and improving the strength and health of soil and plant. Just as we know certain plants need the specific symbiotic micorrhiza around their roots so they can grow, so the Biodynamic vineyard is able to develop the specific symbiotic microlife in the soil.

The use of the prunings and woody matter in the compost help fungal development under the vines aiding this soil and plant health. See the Biodynamic Resource Manual for compost making instructions.[6]

Compost can be made after harvest and pruning and is used the following year. It only needs turning once during its maturation. The use of the Biodynamic Compost Preparations 502-507 help the health of the heap and the farm. It is also the best way of spreading the influence of

Undervine mulching with compost and hay and herbal lay.

Compost heap at Ngeringa vineyard with bales of hay around it to keep insulated.

these Biodynamic Compost Preparations. Compost on a vineyard generally goes out at the rate of 2-5 cubic metres per Ha.

An additional benefit of Biodynamic compost is for incorporating additives, such as Basalt dust and seaweed. Only small quantities (about 5% of normal recommended applications) are needed when included in the compost, where they are broken down and chelated by the bacterial and fungal organisms in the heap. This makes them readily available in the soil when applied which reduces cost and increases efficacy.

Tree Pasting

The bark of the vines is coated with a mixture of Clay, Diatamaceous Earth, Horn Manure 500 and cow manure. A thin mix of these is sprayed or painted onto the trunk of the vines and to cutting wounds after pruning. It radically improves the health and resistance of the vine and kills off over-wintering insects in the bark. See Biodynamic Resource Manual for recipe.

Harvesting Time

Regular use of the Horn Silica 501 throughout the whole year can lead to improved flavour and plant health. Brix /Baume levels can be raised by the use of the Horn Silica 501. It lifts the sugar sap levels, often overnight, so that instead of having to wait weeks for a lift at such a precarious time, a quick move to harvest can ensue.

The Horn Silica 501 increases the dry matter content of the fruit as well as the all important flavour, which is what wine making is all about.

Vern Tebbutt, of Piallago Vineyards, Margaret River, WA, notes that the woodiness of the peduncles of the Cabernet Sauvignon were as thick as a pencil – a hallmark of well ripened fruit.

At Pialligo they have been experimenting with Biodynamics on 5 Hectares of vines. It was the only part of their 50 Ha vineyard that survived the harvest rains in 2003 that ruined the rest of their crop (as well as most of the districts). Their Baume lifted from 12.3 to 13.2 (equivalent to 24% Brix) in 3 days after the application of Horn Silica Preparation 501.

They are so pleased with their Biodynamic crop that they are now working with the rest of the vineyard using Biodynamic management.

Insects – Birds –Peppering

Insect attack only comes if the environment is out of balance and if the plant is also out of balance. Using the full sequence of Biodynamic Preparations regularly will maintain balance and vineyard health. If insect attack occurs, it is usually a sign that not enough 501 has been used. Starting the 501spray at bud burst can prevent bunch weevil infestation.

Birds are another matter. They come because they know the product tastes so good!! Another way is needed to deter them.

Biodynamic Viticulturists use a method called 'Peppering'. The method involves burning a bird and spreading the ashes out around the area that needs to be protected. This does not kill the birds, just makes the ashed area repellent to them.

Biodynamic Viticulturists have had great success against Silvereyes and Cockatoos, Parrots and Blackbirds and Marsupial Mice. The spray seems to last a couple of seasons.

The same method can be used for rabbits, hares, mice and other unwanted pests. The "peppers" can also be made into homeopathic potencies.

Details of these Biodynamic practices are available in the Biodynamic Resource Manual published by Biodynamic AgriCulture Australia, who also supplies all the Biodynamic Preparations to its members. Biodynamic AgriCulture Australia also holds regular introductory Workshops in Biodynamics around Australia. ■

**Cheryl Kemp is Advisory and Education Officer with Biodynamic AgriCulture Australia. The association is a not-for-profit membership organisation promoting and supporting the adoption of Biodynamics in Australia. The Association has many affiliated local Biodynamic groups with local contacts. Workshops and Conferences are held around Australia and are worthwhile attending to get a practical introduction to this farming method. Resource materials, books and support are also available by phone, over the internet or at their office in Bellingen, NSW. Membership of the Association is required to buy the Biodynamic Preparations.*

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[1] See Green Harvest (07) 5494 4676 www.greenharvest.com.au

[2] Bruce Tainio :Interview with Graeme Sait, Nutrition Rules G.Sait Soil Therapy Pty.Ltd

[3]

[4] See Biodynamic Astro Calendar available from Biodynamic AgriCulture Australia office.

[5] Crisp.P.(1) Scott.E.A. (1) Wicks, T.B. (2) Univ. Adelaide, Sustainable control of grapevine powdery mildew, Unicinula necator.

(1) School of Agriculture and Wine, Glen Osmond SA. (2) SA Research and Development Institute, South Australia.

[6] Available free when joining Biodynamic AgriCulture Australia or $26.40 to non-members.