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## CERTIS’ UNIQUE VINE PORTFOLIO

- **Jet-S**
- **Cuprolykt Valbon**
- **Cuprolykt Finalsan**
- **Sluxor HP Valbon**

- Sprouting/bud development 'dormancy' stage
- Sprouting/bud development 'wool' stage
- Leaf development
INTRODUCTION

Wine GB predicts that in 20 years, UK viticulture could be worth £1bn. A rapid growth in plantings over the past few years (including estimates of between 1.7 and 2.5 million new vines in 2018) has put grapevines on the map as a serious UK fruit crop. Couple this with numerous English wines consistently performing in terms of quality at European and international levels, it paints an excellent picture for the future of British wine.

With the area of grapevines rapidly growing across the country, it is important to take a step back to assess what challenges these crops could face in producing for an ever-increasing demand. Consistent productivity is difficult to achieve with British weather systems being so variable year to year. English sparkling wine yields need to hit a long term average of 8t/ha, while only currently achieving 3t/ha (Vine growers year book & buyers guide 2018).

Certis has developed a wide range of conventional and biorational crop solutions to help develop innovative IPM strategies, vital for sustainable production.
GRAPES

KEY DISEASES

Downy Mistletoe (Phasemora viticola)

Life cycle
The pathogen can attack and infect vines from mid-May to late autumn. It is an obligate parasite, so requires living tissue to survive. Wet weather and rising temperatures above 10°C in early spring cause germination of zoospores, the mobile phase of the pathogen. This timing typically coincides with bud break on the vine. These zoospores utilise rain-splash to establish themselves in the canopy.

Symptoms: include yellow patches/spots appear on upper leaf surface, with white fungal growth appearing on the underside of the leaf following lengthy periods of mild and humid weather conditions. Symptoms normally occur 5-7 days after infection (Figure 1).

The disease can lead to premature defoliation and subsequent yield loss through reduced green leaf area, while also potentially spreading onto the developing fruit to produce white fuzzy mycelium, causing the berries to dry out (Figure 2).

The disease overwinters as tough oospores in leaf litter and the soil. Crop loss can reach up to 100% following favourable disease conditions and spread.

Cultural Control
Carry out a bag test on suspected infected leaves by removing from the plant and placing in a plastic bag in a warm dark place. Check for white downy sporulation on the underside the next day.

Consider nutrient status of plants and the general health status of the vineyard. Manage vineyard trellising and irrigation to minimise leaf wetness, and reduce leaf litter left on the ground as this can be a source of inoculum.

Certis Europe offer
Cuprolykt (Label approval)
A protectant fungicide containing (50% w/w) copper oxychloride for the control of downy mildew, anthracnose and bacterial diseases on table grapes and wine grapes.

As a rule, 3 applications should be made during the growing season: starting from BBCH15, 5th leaf unfolded to fruit ripening. Applications must be adapted to disease pressure evolution and always be alternated with fungicides from other FRAC groups. An application after harvest at BBCH91 or after wood maturity will help protect plants from pathogen infections following early frosts.

CERTIS' UNIQUE VINE PORTFOLIO

<table>
<thead>
<tr>
<th>Jet-5</th>
<th>Cuprolykt Valbon</th>
<th>Cuprolykt Finalan</th>
<th>SluxÆ HP Valbon</th>
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</thead>
<tbody>
<tr>
<td>Sprouting/bud development 'dormancy' stage</td>
<td>Sprouting/bud development 'wool' stage</td>
<td>Leaf development</td>
<td></td>
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</tbody>
</table>
GREAT WINE

DISCOVERED BY CHANCE IN 1882, ALEXIS MILLARDET NOTICED THE COPPER USED TO DETER PEOPLE FROM PILFERING FRUIT IN A VINEYARD IN MEDOC ALSO DEMONSTRATED EFFICACY ON DOWNY MILDEW DISEASE. SINCE THEN COPPER HAS BEEN THE BACKBONE OF EVERY DOWNY MILDEW SPRAY PROGRAMME.

Valbon (EAMU/off-label)
An eradicant and protectant fungicide, containing 17.5 g/kg (1.75% w/w) benthiazavcarb-isopropyl and 700 g/kg (70% w/w) mancozeb. A protective and curative fungicide, with residual effects and rainfastness. Valbon inhibits mycelial growth, sporulation and germination of sporingia and zoospore.

For optimal timing, the first application of Valbon should be just before flowering and the second application at bunch closure.

Varieties
Chardonnay and Pinot Noir varieties can be particularly susceptible.

Figure 3. Downy milde on bunches, © State of Western Australia (Department of Primary Industries and Regional Development, WA).
Grapevine

Powdery Mildew (Erysiphe necator)

Lifecycle
The fungus overwinters either within infected buds, which germinate to form mildewed “flag shoots” in the spring; or as minute fruiting bodies (cleistothecia) that lodge in the bark on the vine. They then release spores (ascospores) to infect new foliage and young clusters in the spring (Figure 3).

The subsequent spores (conidia) produced on infected tissues are the same as those produced on flag shoots, so further spread throughout the season is the same regardless of the initial source of infection.

The primary factor controlling the spread of powdery mildew is temperature because the ascospores and the conidia do not require moisture. This is not a major problem in UK vines due to the wet weather conditions; however, uncontrolled infections may result in an avalanche effect the following year if the pathogen overwinters on the crop.

Initial symptoms show as chlorotic spots on the upper surface of the leaf, eventually producing greyish-white fungal growth. Severe infection can lead to leaf distortion and gradual desiccation. Infection can also spread onto the developing fruit, where they can split, shrivel or ripen.

Splitting of the fruit can lead to secondary infection by Botrytis cinerea. Infection of the fruit encourages the development of microorganisms, which leads to a reduction in wine quality as well as yield loss.

Cultural Control
As with downy mildew, trellis management, planting direction and leaf defoliation/pruning are key for the improvement of airflow and reducing humidity and temperature within the vineyard.

Planting of rose bushes at the end of grapevine rows is a typical method for the early detection of powdery mildew, as an initial host plant.

Avoid drought stress to vines, as this can increase disease susceptibility.

Certis offer
Amylo-X (EAMU/off-label)
A protectant bio-fungicide in a water dispersible granule containing 250 g/kg Bacillus amyloliquefaciens subsp. plantarum strain D747 for the control of powdery mildew and other fungal plant diseases.

Amylo-X is effective against a range of plant pathogens on foliage and other plant parts, producing antibiotic compounds that disrupt cell wall production of the target. Amylo-X colonises the plant parts it is applied on preventing the establishment of disease causing fungi and bacteria.

A minimum of two applications are required at pre-flowering and during flowering for optimal performance. Prolonged programmes of up to 6 applications, and just before bunch closure, will also provide Botrytis preventative control.

Cosina (EAMU/off-label)
An emulsion in water formulation containing 50 g/l cyflufenamid for the control of powdery mildew. A fungicide with preventative and, at higher concentrations, curative activity.

CERTIS’ UNIQUE VINE PORTFOLIO

Jet-S
Cuprolykt Valbon
Cuprolykt Finalfan
Sulox HP Valbon

Sprouting/bud development ‘dormancy’ stage
Sprouting/bud development ‘wool’ stage
Leaf development
Cosine prevents haustorium formation and development, growth of secondary hypha and conidiospores formation, has good translaminar movement and vapour action (particularly above 22-25°C), but is poorly translocated within the plant.

The best expression of Cosine's preventive and curative mode of action is with applications made during or just after flowering. Due to the vapour action, later applications when temperatures are above 22-25°C will have visible eradication activity on powdery mildew mycelium especially in mixtures with Karma.

Karma (EAMU off-label)
A water-soluble powder (SP) containing 850 g/kg of potassium hydrogen carbonate for the control of powdery mildew. A fungicide with multi-site contact mode of action, which disrupts potassium ion balance in fungal cells through osmotic pressure, carbonate and bicarbonate ions and pH.

Due to the built-in adjuvant system in the formulation, in the absence of rainfall it can provide limited preventative control by disrupting the release of hydrolytic enzymes used by fungi to infect plants.

For a preventative approach, the first application of Karma should start around first leaf unfolded (BBCH11) up to inflorescence (BBCH53). For a powdery mildew ‘stop’ (eradicant) strategy, applications should start before bunch closure (BBCH75).

Varieties
Bacchus, Pinot Noir & Rondo are more susceptible, Orion & Seyval Blanc are more tolerant.
Grey mould (*Botrytis cinerea*)

**Lifecycle**

Grey mould is a major limiting factor for grape production in UK. The fungus is ubiquitous and can infect leaves and stems but most damage occurs through fruit infection.

Symptoms appear first as 'burns' typically 2-3 cm on leaf edges. These burns are limited and not particularly damaging, but serve as an indicator of disease pressure in the canopy.

Infections occur primarily following bird damage, hail or strong winds, which can cause wounds acting as entry point for the disease. Ideal conditions for disease development are: temperatures of 15-20°C and high relative humidity (>90%) with severe infections likely to occur in wet summers and/or autumns and dense vineyards.

Grapevine flowers are particularly at risk after cap fall when a small wound is created allowing infection to enter the plant. Berries are most at risk after veraison (ripening) as higher sugar levels encourage disease spread.

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**Berry Infection, Known as 'Grey Rot', is Most Commonly Seen, and Most Damaging.**

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**CERTIS' UNIQUE VINE PORTFOLIO**

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<tr>
<th>Jet 5</th>
<th>Cuprokylt Valbon</th>
<th>Cuprokylt Finalsan</th>
<th>Sluxor HP Valbon</th>
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<tbody>
<tr>
<td><img src="image1.png" alt="Sprouting/bud development 'dormancy' stage" /></td>
<td><img src="image2.png" alt="Sprouting/bud development 'wool' stage" /></td>
<td><img src="image3.png" alt="Leaf development" /></td>
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</tbody>
</table>
GREAT WINE

Cultural Control
Crop hygiene is key for tackling Botrytis, requiring good cultural practices as the fungus overwinters on old plant tissues. Crop pruning, canopy management and trellising to ensure good air circulation, and removal of leaves around clusters, will all help to reduce infection risk.

Certi is offer
Amylo-X (EAMU off-label)
A protectant bio fungicide in a water dispersible granule containing 250 g/kg Bacillus amylo liquefaciens subsp. plantarum strain D747 for the control of Botrytis and other fungal plant diseases.

In Certi trials, optimal application timing for a successful preventative strategy was demonstrated from BBCH53 to BBCH62, with a minimum of 2 applications 7 days apart. The highest efficacy has been achieved using Amylo-X throughout the year, with a maximum of 8 applications from BBCH10. Due to the short harvest intervals and no taint in wine quality, using Amylo-X close to, or at harvest, may help increase brix levels and maintain lower disease pressure prior to harvest.

Karma (EAMU off-label)
A water-soluble powder (SP) containing 850 g/kg of potassium hydrogen carbonate for the control of Botrytis. A fungicide with multi-site contact mode of action, which disrupt potassium ion balance in fungal cells through osmotic pressure, carbonate and bicarbonate ions and pH.

For a preventative programme, apply 4 applications of Karma from the end of flowering to bunch closure (BBCH69 – BBCH79) before disease symptoms are visible. Key benefits of Karma are the eradication activity and short harvest interval with no impact on wine quality, as well as the ability to apply the product at harvest when disease symptom appear – ‘stop’ strategy.

Varieties
Varieties producing thin skinned & tightly packed bunches are most at risk, including Chardonnay, Pinot Noir, Muller-Thurgau & Riesling.
OTHER DISEASES

*Phomopsis leaf and cane spot (Phomopsis viticola)*

![Image of Phomopsis viticola](image)

Phomopsis viticola creates pale leaf spots, cracks and girdling on shoots and bleached canes. Prevalent in cool wet weather, its severity increases by prolonged leaf wetness. The disease overwinters in the buds, bark and canes of infected vines and can enter fruit when green, lying dormant until ripening when it can cause fruit rotting.

Vineyards receiving 2-3 sprays for Downy mildew during the susceptible period (up to 15cm shoots) are typically covered.

**Dead arm disease (Eutypa lata)**

Symptoms of Eutypa dieback do not usually appear until vines are at least six years old. Shoot symptoms are most evident during the spring, when healthy shoots are 20-40 cm long.

Shoots arising from infected wood appear stunted with small, chlorotic, distorted leaves, which become necrotic and tattered as the season progresses. Fruit fails to develop or develops very poorly. No other pathogens are known to cause these shoot symptoms.

Good, healthy vineyards do not usually suffer and Eutypa only appears in old vineyards and unmanaged crops.

**Grape Trunk Diseases (Botrissphearia, Cylindrocarpon, Phaeoacremonium and others)**

In most vineyards, the proportion of affected vines is small (less than 5%) but in a few, the disease may spread rapidly with over 50% of vines affected. Young vines can die when the infection moves down the trunk to the graft union.

**CERTIS’ UNIQUE VINE PORTFOLIO**

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<td>Sprouting/bud development ‘wool’ stage</td>
<td>Leaf development</td>
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Infection is from the pruning wound, typically at the retained spur with Guyot pruning. The problem appears worse in young vineyards, less than 10 years old. Older vines appear to be more tolerant. Botryosphaeria is the biggest problem in the UK and there is no established cure. Vineyard managers must pay attention to cultural control and raise the hygiene profile of the crops.

Figure 6: Botryosphaeria © State of Western Australia (Department of Primary Industries and Regional Development, WA)
GRAPEVINE

PESTS

**Spotted Wing Drosophila - SWD** *(Drosophila suzukii)*

Spray timing should be targeted as grapes begin to ripen and change colour (Verison). More importantly monitoring surrounding areas of the vineyard and checking for wild berry presence in wind breaks and hedge rows is crucial. Monitoring traps and pheromones are available from various suppliers.

**Light Brown Apple Moth & European Grape Berry Moth**

The light brown apple moth (LBAM), *Epiphyas postvittana*, is one of the most important pests of apple and other tree fruits, less so in grapevines.

First generation caterpillars can damage opening flowers and lead to increased risk of *Botrytis*, while the second generation can cause damage in the fruit cluster, again leading to the risk of *Botrytis* infection.

Trapping for moths is key for successful control through good timing of application of suitable insecticides.

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**CERTIS’ UNIQUE VINE PORTFOLIO**

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<th>Cuprokylt Finalban</th>
<th>Sluxor HP Valbon</th>
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- Sprouting/bud development ‘dominance’ stage
- Sprouting/bud development ‘wool’ stage
- Leaf development
Grape erineum mite (*Colomerus vitis*)

This mite is similar in morphology to bud mite. It is microscopic, wormlike, and white-yellow in colour. It overwinters between outer bud scales and bud tissue and feeds on leaves during spring and summer.

The upper leaf surface blisterers and the lower leaf surface of the blister appears hairy and white, almost resembling fungal growth. The lower leaf surface turns from a white colour early in the season and progresses to yellow or brown later in the season.

Although it is not an economically important pest, in some years the severity of the problem can lead to lower yields. This is a result of attacks on the flower formation early in the year.

*Certo* offer

*Majestik*

A fast-acting, contact insecticide in a soluble concentrate formulation containing (49% w/w) malodextrin. Majestik should be applied at the first sign of pest attack and acts by blocking the spiracles (insects breathing holes) which then causes suffocation. It has short persistence and a zero days harvest interval.

Achieving high levels of control with Majestik is with multiple applications of a fine to medium spray, to ensure thorough coverage, particularly to the underside of leaves or the affected parts of the vines. The maximum effect will normally be seen within 2–4 hours after application. Further mortality will only be seen following repeat applications at 4–7 day intervals, with a maximum of 20 applications per year.

**Other pests**

Scale insects, capsids, thrips, leaf hoppers, black vine weevil and spider mites can all cause some limited leaf scarring leading to Botrytis infections as well as act as vectors for other pests and diseases and damage roots.
WEED & SUCKER CONTROL

Weed control strip

Weed control in vineyards is important for the establishment and improved vigour of new vines, as well as the growth and yield of established vines.

The effect of competition from weeds can be most severe in the first three years of planting and weedy vineyards have the potential to hold back the crop, delaying production of a viable crop for another one or two years.

Adopting a herbicide programme in the first three years of planting is often difficult.

- Translocated herbicides pose a risk to the young plant due to uptake and leading to the potential loss of significant investment.

- Residual herbicides also pose a risk, especially after planting and in the first year of growth, and may cause severe distortion of the balance between root growth and vegetative canopy growth.

Certis offer

Finalsan (label approval)

A non-selective bio-herbicide in an emulsifiable concentrate formulation containing 186.7g/l pelargonic acid for use against annual and perennial weeds, mosses and algae.

CERTIS’ UNIQUE VINE PORTFOLIO

Jet-S  Cuprokylt Valbon  Super HP Valbon

Sprouting/bud development 'dormancy' stage  Sprouting/bud development 'wool' stage  Least development
Finalsan is a contact herbicide with desiccant properties and no risk of uptake by newly planted vines. Fully biodegradable in plants and in soil with no persistence. The pelargonic acid penetrates the waxy leaf cuticle and destroys the cell membranes. This exposes the cell contents to the elements resulting in rapid desiccation. As there is no translocation activity, for best results good coverage of the weed target is essential.

The highest efficacy of Finalsan is achieved when it is applied to actively growing, small young weeds – up to 5-10cm high or no later than 8th true leave. To achieve control of more difficult weeds, such as grasses and thistles, a minimum of 2 applications using a 17% concentration are required, with a maximum interval of 2 weeks.

Grapevine suckers

Suckers are undesirable shoots originating below ground and on the rootstock of the vine. It is important to remove these as they are competing for energy, nutrients and water with the upper canopy, the part of the vine that will produce fruit. Removal of these shoots is called ‘suckering’. Typically a mechanical hand operation that can be time consuming & damaging, sometimes leaving an open wound on the trunk.

Certiq offer

Finalsan (Label approval)

A non-selective bio-herbicide in an emulsifiable concentrate formulation containing 186.7g/l pelargonic acid.

Due to the contact mode of action and non-systemic action, Finalsan is an effective way of reducing labour costs and time when managing suckering, with no risk to the crop. The product is non-volatile so reduces the risk to the upper canopy. Applied from early spring for weed control and suckering, Finalsan delivers value by combating two problems at once. Finalsan requires mild and dry conditions for it to be effective with results showing within 24 hours of application.

For effective sucker control a minimum of 2 applications are required with targeted hooded equipment. Apply, using a 17% concentration, from mid-May to mid-June with an interval of 7–10 days. Incidental drift onto the canopy may cause transient burn marks but do not affect the yield or plant growth.

The use of Finalsan for suckering is particularly effective when the product is applied up to 4th leaf stage on the suckers or 10-12cm length.
Disinfectants

Hygiene is important in every aspect of crop production from removal of leaf debris, pruning's, rotten fruit and dead plants to pruning tools, general equipment, staff clothing and clean water sources. Utilising an approved disinfectant will help with general crop health as well as reduce the spread of diseases and pests in the crop and the facilities.

Certis offer

Jet-5 (bio dide)
A powerful disinfectant containing (5% w/w) peroxycetic acid, recognised as a food grade sanitiser with organic status. Containing peroxycetic acid, it can be used in all areas of horticulture and agriculture for the disinfection of all surfaces including glasshouses, tools, pots, trays, benches, equipment, paths, buildings stores and irrigation systems.

Jet-5 provides excellent contact action with no residues left on hard surfaces. The product breaks down into CO₂ and water with an acidic scent to highlight its use as part of a

CERTIS’ UNIQUE VINE PORTFOLIO

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<tr>
<th>Jet-5</th>
<th>Cuprolykt Valbon</th>
<th>Cuprolykt Finolax</th>
<th>Sluxx HP Valbon</th>
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</thead>
<tbody>
<tr>
<td>Sprouting/bud development 'dormancy' stage</td>
<td>Sprouting/bud development 'wool' stage</td>
<td>Least development</td>
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</table>

Proven to be reliable with low risk to staff and bystanders as well as the environment.

**Molluscicides**

The density of slug and snail populations can vary substantially across the vineyard. They often migrate into the vineyard from adjacent heavily infected areas, therefore focusing control efforts on the vineyard boundary and adjacent areas can minimise migration into the vineyard. Plants and organic matter provide food sources and shelter so it is important to minimise these habitats with suitable cultivation and soil hygiene practices as part of an Integrated Pest Management strategy.

Fermic phosphate occurs naturally in the environment. It is transformed into iron and phosphate by micro-organisms in the soil and becomes part of the soil and its nutrient range.

With excellent anti-moulding properties, the Sluxx HP deep blue pellet is highly efficacious against all relevant slug species and garden snails. The bait technology used in Sluxx HP has a novel mode of action and feeding ceases immediately following consumption of the bait.

It should be noted that no excessive slime secretions will be evident either on or around the crop. As slugs usually retreat underground to die, there will not be any evidence of dead slugs. Efficacy is measured by the decrease of feeding damage in the crop. The result of treatment with Sluxx HP can therefore only be assessed on the basis of reduced crop damage.

Curtis Offer

Sluxx HP

Sluxx HP is a granular bait formulation containing 29.7g/kg (2.97% w/w) fermic phosphate.
## SUMMARY

### Certis Viticulture Portfolio

<table>
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<tr>
<th>Product</th>
<th>Active ingredient</th>
<th>Target</th>
<th>Label Timing/ harvest intervals</th>
<th>Organic Approval</th>
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<tbody>
<tr>
<td>Amylo-X</td>
<td>Bacillus Amylophilus 250g/kg</td>
<td>Botrytis, Powdery Mildew</td>
<td>BBCH 10 - BBCH 89</td>
<td>✓</td>
</tr>
<tr>
<td>Cosine</td>
<td>50g/l Cylufenamid</td>
<td>Powdery Mildew</td>
<td>21 day harvest interval</td>
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<tr>
<td>Cuprolyt</td>
<td>50% copperas copper oxychloride</td>
<td>Downey Mildew</td>
<td>21 day harvest interval</td>
<td>✓</td>
</tr>
<tr>
<td>Finalan</td>
<td>186.7g/l Pelargonic acid</td>
<td>Grapevine suckers</td>
<td>1st May – 1st Sept</td>
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<tr>
<td>Jet-5</td>
<td>5% w/w Peroxyacetic acid</td>
<td>Disinfectant</td>
<td></td>
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<tr>
<td>Karma</td>
<td>850g/kg potassium hydrogen carbonate</td>
<td>Botrytis</td>
<td>0 day harvest interval</td>
<td>✓</td>
</tr>
<tr>
<td>Majestik</td>
<td>598g/l maltodextrin</td>
<td>Spider mite &amp; mites, flies and aphids</td>
<td>0 day harvest interval</td>
<td>✓</td>
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<tr>
<td>Sluux HP</td>
<td>29.7g/kg fermen phosphate</td>
<td>Slugs &amp; garden snails</td>
<td>0 day harvest interval</td>
<td>✓</td>
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<tr>
<td>Valbon</td>
<td>17.5g/kg Benfloxylcarb + 700g/kg Mancozeb</td>
<td>Downy Mildew</td>
<td>56 day harvest interval</td>
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### Timing Guidance

<table>
<thead>
<tr>
<th>January</th>
<th>February</th>
<th>March</th>
<th>April</th>
<th>May</th>
<th>June</th>
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<tr>
<td>Pruning</td>
<td>Cutting/coll ecting shoots.</td>
<td>Trellising maintenance</td>
<td>Budburst</td>
<td>Debudding</td>
<td>Flowering</td>
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<td></td>
<td>Bumming and ploughing</td>
<td>Staking/anchoring</td>
<td>Ploughing down</td>
<td>Suckering</td>
<td>First trimming</td>
</tr>
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- Amylo-X
- Cosine
- Cuprolyt
- Finalan
- Jet-5
- Karma
- Majestik
- Sluux HP
- Valbon
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<table>
<thead>
<tr>
<th>July</th>
<th>August</th>
<th>September</th>
<th>October</th>
<th>November</th>
<th>December</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nouaison</td>
<td>Veraison</td>
<td>Checking maturity</td>
<td>Vinification</td>
<td>Ploughing back</td>
<td>Pruning</td>
</tr>
<tr>
<td>Forst leaf thinning</td>
<td>Green harvesting</td>
<td>Harvests</td>
<td></td>
<td>Blending before aging</td>
<td></td>
</tr>
</tbody>
</table>

| Cuprolyt      | Jet-5            |                 |                 |               |               |

|                 |                  |                 |                 |               |               |