

INTEGRATED PEST MANAGEMENT OF GRAPE - EUCLID IPM PACKAGES



DISEASES	MANAGEMENT CRITERIA	NOVEL SOLUTIONS FROM EUCLID PARTNERS (YEAR OF EXPECTED AVAILABILITY)	LIST OF ACTIVE INGREDIENTS	ALLOWED IN ORGANIC FARMING	Max nb. of a. i. application/year (see note 1)	Max nb. of a.i. group application/year (see note 2)	RESTRICTIONS OF USE AND NOTES
<p style="text-align: center;">Downy mildew <i>(Plasmopara viticola)</i></p>	<p>General indications: Use a preventive control approach. Adoption of DSS tools is highly recommended. The following aspects should be considered: weather forecast, supposed epidemic risk and possible residual control of previous treatments. The duration of efficacy of treatments is related to the persistence of the products applied, to their resistance to watering and to vine growth speed. When the bunch of grapes start to be closed, the disease is usually less dangerous so it is possible to apply copper fungicides only.</p>	<p>2017-2019: Integration of products present in the list of active ingredients with products from project partner ANT: at least "ANT-Ca" x 2 applications applied every 7-14 days prior to flowering (during bud break) and 2 applications during fruit set and fruit fill. Contact ANT: ceo@agrinewtech.com for more details</p> <p>2018-2019: To optimize pesticides use apply the DOSA3D Decision Support System. Contact project partner University of Lleida santiago.planas@udl.cat for more details</p>	Benalaxyl				
			Benalaxil-M			3	
			Metalaxyl		1		
			Metalaxyl-M				
			Amisulbrom		3		
			(Cyazofamid + Disodium phosphonate)			3	
			Ametoctradin		3		
			Benthiavalicarb-isopropyl				
			Dimethomorph				
			Iprovalicarb				4
			Mandipropamid				
			Valifenalate				
			Cymoxanil		3		
			Zoxamide		4		
			Fosetyl-Al				
			Famoxadone		1		
			Fenamidone				3
			Pyraclostrobin				
			Potassium phosphonate		5		
			Fluopicolide		2		
Metiram							
Propineb							
Dithianon		3		4			
Mancozeb		3					
Folpet		3					
Fluazinam		3					
Copper fungicides	YES						
<i>Ampelomyces quisqualis</i>	YES						
<p style="text-align: center;">Powdery mildew <i>(Uncinula necator-Oidium tuckeri)</i></p>	<p>High-risk areas: Start the treatments from bud burst (presence of infected sprouts) or in the stage of separation bunches. Since the beginning of flowering until the closure of bunch the control must be carried out with great attention, alternating as much as possible available products.</p> <p>Low-risk areas: the specific treatments may be started just before the beginning of flowering and finished at bunch closure.</p> <p>Notes: <i>Ampelomyces quisqualis</i>, potassium bicarbonate and sulphur are primary recommended for the control.</p>	<p>2017-2019: Integration of products present in the list of active ingredients with products from project partner ANT: at least "ANT-Ca" x 2 applications applied every 7-14 days prior to flowering (during bud break) and 2 applications during fruit set and fruit fill. Contact ANT: ceo@agrinewtech.com for more details</p> <p>2018-2019: To optimize pesticides use apply the DOSA3D Decision Support System. Contact project partner University of Lleida santiago.planas@udl.cat for more details</p>	Azoxytrobin				
Pyraclostrobin							
Trifloxystrobin				3			
Potassium bicarbonate		YES					
Boscalid				1			
Cyflufenamid		2					
Meptyldinocap		2					
Bupirimate		3					
Metraphenone		3					
Spiroxamine		3					
Quinoxifen		2					
Cyproconazole				1			
Difenoconazole							
Myclobutanil							
Propiconazole							
Tebuconazole				3			
Fenbuconazole							
Penconazole							
Tetraconazole							
Sulphur		YES					
<p style="text-align: center;">Grey mould <i>(Botrytis cinerea)</i></p>	<p>Agronomic strategies - to select vine varieties and rearing systems; - to adopt balanced fertilisations; - to carry out green pruning in a rational way.</p> <p>Chemical strategies: In vine varieties located in the high-risk areas are recommended 2 preventive measures: in bunches pre-closing stage and 3-4 week before the harvesting.</p> <p>Do not carry out more than 2 treatments per year against grey mould except for the biological products: <i>A. pullulans</i>, <i>B. amyloliquefaciens</i>, <i>B. subtilis</i> and Potassium bicarbonate.</p> <p>Low-risk areas: it is recommended to treat only if the weather condition is very much in favour to disease development.</p>	<p>2017-2019: Application of the BCA MACH1 from project partner ANT: at fruit set, fruit ripening and before harvesting. Contact ANT: ceo@agrinewtech.com for more details</p>	<i>Aureobasidium pullulans</i>	YES			
<i>Bacillus amyloliquefaciens</i>	YES						
<i>Bacillus subtilis</i>	YES						
Potassium bicarbonate	YES						
Fludioxonil		1		1			
Cyprodinil		1					
Pyrimethanil		1					
Boscalid				1			
Fenhexamid		1					
Fenpyrazamine		1					
Fluazinam				3			

PLANT PATHOGENS

After the 3rd consecutive treatment with CAA use an a.i. with a different mode of action.

Exclusively usable in a mixture with other fungicides for

Dithiocarbamates and Ditanon are usable up to fruit set and in any case not later than 30 June.

Maximum 6 kg/ha of a.i./ha/year.

Only 1 treatment between Pirimetanil, Ciprodinil and Ciprodinil+Fludioxonil.

Black rot (<i>Guignardia bidwellii</i>)	Agronomic strategies: - collecting and destroying infected bunches; - burning pruning parts.	No specific strategies developed within EUCLID project	Difenoconazole		1	3	
	Chemical measures: Treating only in the vine varieties affected by this disease.		Myclobutanil				
Dead-arm (<i>Phomopsis viticola</i>)	It is recommended to carry out treatments at the first vegetative phases only in the vine varieties affected by this disease.	No specific strategies developed within EUCLID project	Penconazole			3	Usable only up to fruit set and in any case not later than 30 June.
			Tetraconazole				
Esca and other wood fungal diseases (<i>Phaeoaniella chlamydospora</i> , <i>Phaeoacremonium aleophilum</i> , <i>Fomitiporia mediterranea</i>)		No specific strategies developed within EUCLID project	Trifloxystrobin			3	
			Mancozeb				
Grapevine trunk diseases (<i>Eutypa lata</i> and <i>Botryosphaeria dothidea</i>)		2018-2019: Trichoderma strains. Contact BINAB for more details: thomas.ricard@binab.se	Mancozeb			3	
			Metiram				
			Propineb				
			Sulphur	YES			
			(<i>Trichoderma asperellum</i> + <i>Trichoderma gamsii</i>)	YES			

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(2) Limitation of active ingredients (a.i.) application must be considered as total limit number of applications of a.i. from the same group (same chemical families generally)/year for each pest. The a.i. indicated in the same merged cells are from the same group and can be therefore used for the same target. If the column is empty, no restrictions should be considered.



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INSECT PESTS	European grapevine moth (<i>Lobesia botrana</i>) Vine moth (<i>Eupoecilia ambiguella</i>) Eulia (<i>Argyrotaenia (=Eulia) pulchellana</i>)	General indications: Treatments with insecticides against the first generation are forbidden. Thresholds for II and III generations: 5% of bunches infested by eggs in case of application with <i>Bacillus thuringiensis</i> ; 10% of bunches infested by eggs in case of application of other insecticides. Maximum 2 treatments/year with synthetic products. Time of sampling: II generation: from "inflorescence development" to "closure of the bunch"; III generation: from "ripening/veraison" to 1st decade of September. The use of the <i>B.thuringiensis</i> requires the best timing (black head or half hatching eggs) and accuracy of implementation. It is recommended to add 500 g/ha of sugar to <i>B. thuringiensis</i> . The treatment must be to repeat in case of rain because the product is easily washed out.	No specific strategies developed within EUCLID project	<i>Bacillus thuringiensis</i> var. <i>kurstaki</i>	YES			Sexual confusion and disorientation methods are primary tools to be used against the moths. Authorised only against <i>Lobesia</i> Authorised only against <i>Lobesia botrana</i> and <i>Eupoecilia ambiguella</i> .
				Sexual confusion and disorientation method	YES			
				Indoxacarb			1	
				Spinosad	YES	1	2	
				Chlorantranilprole		1		
				Methoxyfenozide				
Tebufenozide								
Emamectin			2					
	Smaller green leafhopper (<i>Empoasca vitis</i>)	General indications: Maximum 1 treatments/year, to be done on the II generation. Thresholds for treatments: - susceptible vine variety: > 1.5 mobile forms/ leaf; - moderate susceptible variety: > 2.5 mobile forms/ leaf; - tolerant variety: > 4 mobile forms / leaf; - for other cultivars: > 2.5 mobile forms / leaf.	No specific strategies developed within EUCLID project	Insecticidal soaps (Potassium Salts of Fatty Acids)	YES			Only for post-flowering treatments.
				Buprofezin			1	
				Etofenprox			1	
				Indoxacarb			1	
				Thiamethoxam			1	
	American grapevine leafhopper (<i>Scaphoideus titanus</i>)	General indications: Carry out the treatments in the outbreak and risk areas, according to indications from local authorities. Maximum 3 treatments, except for field of mother plants for scions. Treatments with pesticides are forbidden for not damaging bees during flowering of grape or natural flowering of spontaneous plants.	No specific strategies developed within EUCLID project	Buprofezin			1	Treatments to be carried out not later than June 30th. Only for post-flowering treatments.
				Chlorpyrifos			1	
				Chlorpyrifos-methyl			1	
				Etofenprox			1	
				Acetamiprid				
				Thiamethoxam			1	
	Auger beetle and vine borer (<i>Sinoxylon sexdentatum</i>) (<i>Sinoxylon perforans</i>)	General indications: Apply agronomic strategies in case of heavy attacks: hang up along the rows from mid-April to mid-May, groups of vine sticks from pruning to attract the ovipositing females. In the middle of June, when the oviposition is over, remove and burn the sticks to destroy eggs and larvae present	No specific strategies developed within EUCLID project					
	Yellow spider mite (<i>Eotetranychus carpini</i>) European red spider mite (<i>Panonychus ulmi</i>)	General indications: Maximum 1 acaricide treatment/year. Threshold considering the presence of natural predators (Phytoseiidae, Miridae, Anthocoridae, Coccinellidae...): - visibly separated bunches: 5 mobile forms/ leaf; - mid-July : 10 mobile forms/ leaf; - mid-August: 10 mobile forms/ leaf.	2018-2019: Multi-outlet sprayers with outlets (MakatoSEP MB & Ilemo Hardy Mercury) are more adapted to early stages. Adjust the volume rates by canopy vigour characterization from aerial images to reduce the amount of pesticides. Good efficacy of abamectin against yellow spider mite at a lower dose with low vigour of plants. For indications on the application of DSS-DOSA3d, contact project partner University of Lleida: santiago.planas@udl.cat	Tebufenpyrad Clofentezine Hexythiazox Pyridaben Etoxazole Abamectin (aka avermectin)				
NEMATODES	Grape Nematodes (<i>Xiphinema index</i>)	General indications: Use healthy and certified breeding material from nurseries.	No specific strategies developed within EUCLID project					
OCCASIONAL INSECT PESTS	Grape Thrips (<i>Drepanothrips reuteri</i>)	Evaluate the situation at the beginning of season and apply treatments only in case of heavy infestations that stop budding.	No specific strategies developed within EUCLID project	Spinosad	YES		2	
	Noctuids	Maximum 1 treatment/year localised at the base of the stump, only after establishing the initial damages during the budding phase. Hand-picking is recommended for small surfaces (<0.5 ha)	No specific strategies developed within EUCLID project	Deltamethrin Beta-cyfluthrin				
	Grape leaf rust mite (<i>Calepitrimerus vitis</i>)	Maximum 1 treatment/year, in case of heavy infestations at bud break.	No specific strategies developed within EUCLID project	Hexythiazox Mineral oil Abamectin (aka avermectin) Etoxazole	YES			

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