Current downy mildew control strategies in Swiss organic vineyards

Lucius Tamm, Thomas Amsler, Hansjakob Schaerer, Dominique Lévite and Andreas Häseli

***Abstract* - The currently used downy mildew control strategies in *vitis vinifera* in Switzerland are based on the use of acidified clay products combined with copper and sulphur.**

Data from 1997-2003 show that acidified clay products are a valuable alternative to control downy mildew of grapevine in conditions of medium rain fall, good spray timing and with a good application technique. The limits of these products show under heavy rain conditions and when there is high disease pressure. [1]

Introduction

Downy (*Plasmopara viticola*) and powdery (*Uncinula necator*) mildew may cause substantial losses in organic viticulture. Copper is still widely used for downy mildew control. However, copper use is criticized due to its ecotox profile. As a result, its use has been restricted to 6 kg/ha and year in the EU and in Switzerland, the maximum annual load is limited to 4 kg/ha. In the future, copper use may be phased out altogether (Willer et al, 2002).

Since the early nineties, alternatives to copper have been evaluated in Europe (Häseli A., 1995). Among the evaluated alternatives, products based on acidified clay (e.g. Myco-San, Myco-Sin) are the most widely used alternatives in Swiss commercial vineyards. However, the efficacy of these products is judged differently by various authors. In general, acidified clays have shown some efficacy in Germany and Switzerland, whereas in France and Italy, results were less favourable.

In commercial organic winegrowing, crop protection products need to fit into strategies which cover various pests & diseases. The aim of this study was therefore to (i) evaluate the efficacy of acidified clay minerals under various climatic conditions and (ii) to integrate these products into a crop protection strategy which covers all important disease complexes.

Materials and Methods

Field trials were conducted in the FiBL screening vineyard (cv Riesling x Sylvaner, 5BB) in Frick, Switzerland between 1997-2003. All trials were set up as complete randomized block design with 4-9 replicates. Fungicide applications were made with knapsack sprayers (base volume 1000 L/ha) according to good farming practice, based on the disease warning system provided by the weather station Lufft HP-100. Fungicide applications were renewed after a maximum of 25 mm. Applications were made prior to rain events in order to cover a maximum of newly grown leaf tissue.

Several different plant protection strategies against *P. viticola* were compared (Table 1). Tested products: copper oxichloride (Cuprofix, 50% copper metal), wettable sulphur (Thiovit, 80% sulphur), Acidified clay + sulphur (Myco-San), acidified clay (Myco-Sin).

Table 1. Evaluation of Plant protection strategies against Plasmopara viticola and Uncinula necator in Frick, Switzerland. Numbers indicate kg/ha and application. Base=1000L/ha and application.

		bud swelling	bud burst		5-6 leaves	inflorescence development	begin of flowering	full flowering	late flowering	berries small	berry touch	véraison	berry ripening
		B	C	E	F	G	H	I	J	K	L	M	N
	Risk period												
Strategy combined Myco-San	Copper metal					0.4	0.5	0.6				0.8	0.8
	Myco-San			3-4					8.0	9.0	10.0		
	Thiovit			2-3	4.0	4.0	4.0	2.0	3.0	3.0			
	Fenicur											5.0	5.0
Strategy combined Myco-Sin	Copper metal					0.4	0.5	0.6				0.8	0.8
	Myco-Sin			2-3					6.0	7.0	8.0		
	Thiovit			2-3	4.0	4.0	4.0	4.0	5.0	6.0			
	Fenicur											5.0	5.0
Copper-free Myco-San	Copper												
	Myco-San			3-4	5.0	6.0	7.0	8.0	9.0	10.0	10.0	10.0	
	Thiovit			2-3	2.0	2.0	2.0	2.0	2.0	3.0			
	Fenicur												
Copper-free Myco-Sin	Copper												
	Myco-Sin			3-4	4.0	5.0	6.0	6.0	7.0	8.0	8.0	8.0	
	Thiovit			3.0	3.0	4.0	5.0	5.0	5.0	5.0	2.0		
	Fenicur												
Copper only	Copper metal			0.1	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	Acidified clay												
	Thiovit			2-3	4.0	4.0	4.0	4.0	5.0	6.0			
	Fenicur											5.0	5.0

Lucius Tamm, Thomas Amsler, Hansjakob Schaerer, Dominique Levite and Andreas Haeseli are with the Research Institute of Organic Agriculture, CH-5070 Frick, Switzerland (lucius.tamm@fibl.org, thomas.amsler@fibl.org, hans-jakob.schaerer@fibl.org, dominique.levite@fibl.org, andreas.haeseli@fibl.org)

Results

We evaluated selected, commercially available products alone and in combined strategies during 5 years. All products provided good protection against downy mildew (Fig. 1). However, copper was more efficient than acidified clays if applied at 0.05% throughout the season resulting in a total amount of copper per season of 6-8 kg/ha (which is illegal in Swiss conditions). The comparison of legal strategies (up to 4 kg copper metal/ha year) reveals that all strategies where successful as compared to non-treated controls (Fig. 2).

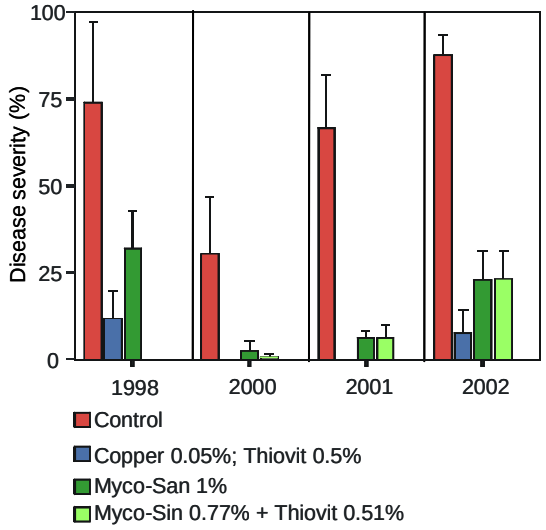

Figure 1. Comparison of plant protection products against Plasmopara viticola in Frick, Switzerland during several seasons.

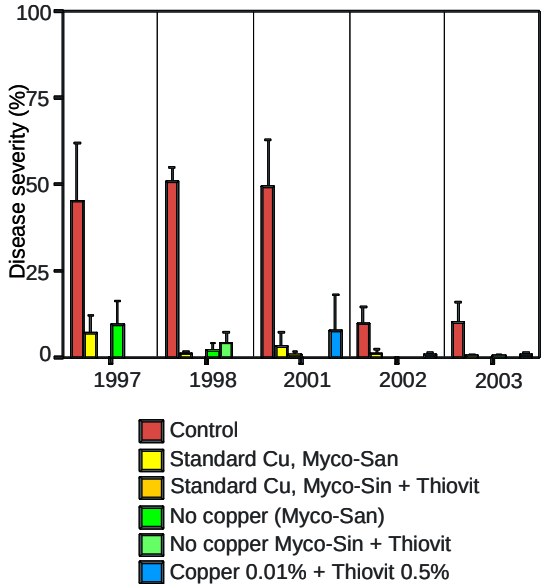

Figure 2. Comparison of plant protection products against Plasmopara viticola in Frick, Switzerland during several seasons.

Discussion

We compared several plant protection strategies between 1997 and 2003. The strategies included copper-intensive, intermediate and copper free treatments. All of the strategies are currently used in Switzerland. In Frick, disease severity caused by *P. viticola* varied in control plots between 10% and 50%, depending on climatic conditions. All of the studied strategies controlled *P. viticola* well under moderate climatic conditions. In combined strategies, the change between copper and acidified clays may lead to phytotoxicity. We therefore recommend to switch between products only after a minimum of 15 mm of rainfall Tamm et al., 2004).

The limits of the available products and strategies show up if wheather conditions are extremely conducive to the development of an epidemic. In 1999, none of the strategies provided adequate control and the trial had to be stopped subsequently (data not shown) . Under such conditions, more efficient products are needed if copper is to be replaced.

Conclusions

Our results show that acidified clay products are a valuable alternative to control downy mildew of grapevine in conditions of medium rain fall, good spray timing and with a good application technique. The limits of these products show under heavy rain conditions and when there is high disease pressure.

The new formulation of Myco-Sin (Myco-Sin Vin) is available and has shown to be as effective as continuous copper treatments under our conditions.

Acknowledgement

This work was supported by the Ministry of Agriculture of Switzerland (BLW) and Gebrüder Schaette GmbH.

References

Häseli A., 1995: Versuche zur Krankheitsbekämpfung im biologischen Rebbau in der Schweiz. In: Hampl U., Hofmann U., Dostal B., Lünzer I., Wagenitz J. (eds) 5. Internationaler ökologischer Weinbaukongress, pp. 57-64. Stiftung Ökologie und Landbau, Bad Dürkheim.Hansen, A. (1995). "A Guide to good writing for scientists", 2nd edn (Low Budget Publishing: Viborg, Denmark).

Willer, Helga; Häseli, Andreas; Levite, Dominique and Tamm, Lucius (2002) Organic Viticulture in Europe . Published in Canadian Organic Growers, , Eds. Proceedings of the The 7th international Congress on Organic Viticulture and Wine. August 20-21, Victoria, Canada. Canadian Organic Growers, Victoria, Canada.

Tamm, L.; Fuchs, J.G.; Böger, N.; Mühletaler, L.; Amsler, A.; Levite, D. and Häseli, A. (2004) Eigenschaften von Tonerdepräparaten: Erfahrungen aus der Schweiz [Properties of acidified clay preparations: the Swiss experience]. Paper presented at Internationales Symposium für ökologischen Weinbau. Intervitis Stuttgart, Stuttgart, 12.-13. Mai 2004, page pp. 27-36.