Establishment of a strong Powdery Mildew Population – Experimental approaches to Remediation

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1 Background for the implementation of the trial

In recent years, a high population of powdery mildew has built up in many areas in Württemberg and other wine-growing regions in Germany. Due to the biology of the powdery mildew fungus, which overwinters as a dormant mycelium in the buds and grows as a pointer shoot in the following year, triggering new infections, a previous year's infestation means higher infestation pressure in the following year (Kast and Bleyer, K, 2011). Many areas are so heavily infested that it is difficult for winegrowers to control the disease in subsequent years. This was the reason why we carried out trials in an area where extremely high Oidium pressure had built up over several years, so as to see if it is possible to rehabilitate this area.
Until 2017, powdery mildew and downy mildew trials were conducted in Weinsberg at the locations Schemelsberg and Glückenhälde. In the Powdery mildew trials on the grape variety Cabernet Dorsa in the Glückenhälde site, after increasing infestation a change was possible within the plot. 2018 the trials have been taking place at the location Grabenäcker. The plots at this site were specifically established for plant protection trials: 11 ares with the grape varieties Pinot meunier; 30 ares with Blauer Trollinger (Vernatsch) and 58 ares with Müller-Thurgau. The powdery mildew trials were to be carried out mainly on the sensitive grape variety Blauer Trollinger.
After a low infestation of powdery mildew in the first trial year 2018, an infestation intensity of 20% at the grapes of some variants we would recommend to the winegrowers, was already recorded in the second trial in 2019. In the third trial year 2020, all variants, including many "practice standard variants", had a total infestation of more than 80% intensity (Figure 1). The reason for this increase may have been the high infection pressure on the plants due to the weather and location, the heavy infection in the intermediate rows by inoculation with plants infested with powdery mildew and resistant fungal strains against two groups of active ingredients.

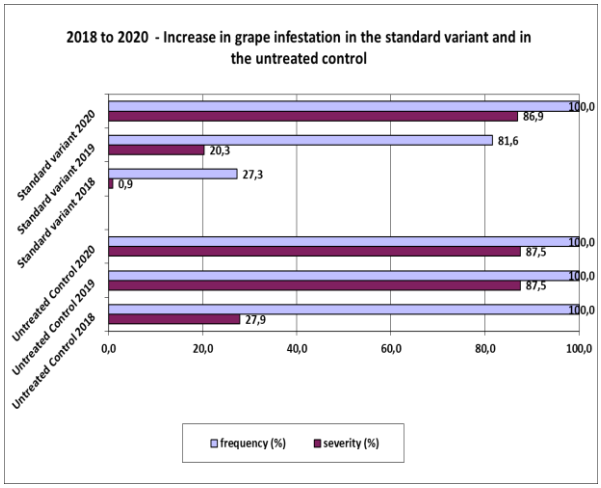

Figure 1: Establishment of the powdery mildew potential – powdery mildew experients 2018 to 2020.

2 Procedure for the rehabilitation trial

As in 2020 the Trollinger area could not be used for an accurate trial after the heavy powdery mildew infestation, in 2021 the powdery mildew demonstration and strategy trial was carried out on Müller-Thurgau. In order to not further increase the powdery mildew pressure due to the heavy infestation of the previous year and the humid location, a block trial was set up for the grape variety Blauer Trollinger. It was carried out with two variants in two repetitions without untreated control and without infected intermediate rows. In addition, the experiment was divided into 4 blocks so that data could be collected from a total of 16 replicates (Figure 2). An establishment of the resistant strains was to be prevented. One variant was treated only with sulfur and partial addition of Wetcit, during the critical period for infections of the clusters (Kast and Bleyer,K, 2011). Wetcit is an oil-based wetting agent and additive. On the second variant, only agents with organic active ingredients were used, excluding the two groups of active ingredients to which resistance was detected (Figure 3). The sprayings were carried out as far as possible following the given intervals of the effect duration table according to OiDiag- 3.0 (Figure 4) which is integrated in vitimeteo as “Vitimeteo – Oidium” (Kast, W.K., Bleyer,G., Bleyer,K., 2013). In “Vitimeteo -Oidium” an index value is calculated. It indicates the current danger and thus the risk of infestation on the grapes for powdery mildew. Taking into account the ontogenetic resistance (Kast, W.K. and Stark Urnau, M., 1999) (Gadoury et al. 2003), the index is thus highest in the period between BBCH 59 and BBCH 75. The index value is composed of the factors temperature, rainfall,

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humidity and stage of development of the vine (Kast, W.K. and Bleyer, K, 2011).

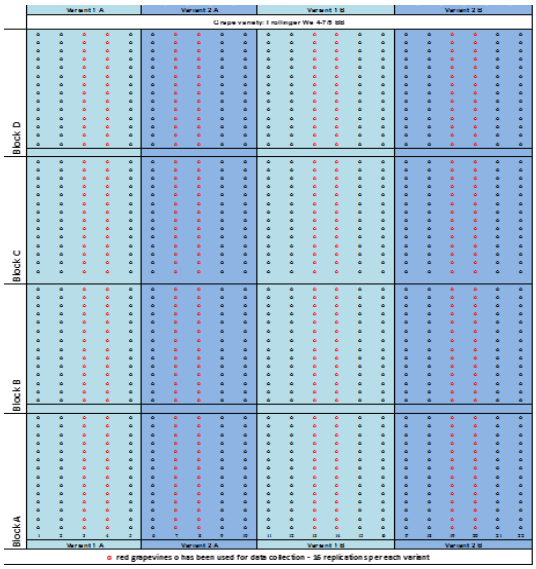

Figure 2: Experimental Setup

Date in 2021	Var 1 - Sulfur	Var 2 agents with organic active ingredients
31.5	Sulfur	Sulfur
9.6	Sulfur	Prosper Tec
16.6	Sulfur + Wetcit	Talendo
22.66	Sulfur + Wetcit	
25.6		Prosper Tec
30.6	Sulfur + Wetcit	
2.7		Dynali
7.7	Sulfur + Wetcit	
12.7	Sulfur + Wetcit	Talendo
22.7	Sulfur	Topas
3.8	Sulfur	Topas

Figure 3: Timing and products of spraying in the trial

Maximum possible duration of action according to OiDiag 2021 of the approved agents in Germany

Last used powdery mildew fungicide		Current index value 0-33 low risk	34-66 middle risk	> 66 high risk
products / active substance	Classification	Days maximum spray interval		
Netzschwefel (Sulfur)	1	10-12	7-9	6-7 *
Kumar				
Vitisan				
Custodia	2	11-13	8-10	**
Sarumo				
Systhane 20 EW				
Topas				
Prosper TEC, Spirox				
Collis	3	12-14	11-13	9-10
Dynali				
Kusabi				
Talendo				
Vivando				
Luna experience	4	***	13-14	10-12
Luna Max				
Sercadis				

Please note the grape variety sensitivity and the recommendation of the local viticultural advisory service!

* Application in critical phase only in organic crop protection.
** No application of these products in case of high risk
*** Application only in critical phase at high index values

Note: The information on spraying intervals in days is based on test results and empirical values. They are intended to provide assistance in better estimating the spraying intervals. The use of this table is the sole responsibility of the user.

Figure 4: Duration of action of fungicides by Oidig 3.0 in 2021

In the parallel running powdery mildew demonstration and strategy trial with the grape variety Müller-Thurgau, intermediate rows were established. In 2021, these were not inoculated with powdery mildew. The treatment of the separation rows was started at stage BBCH 68. A total of four treatments with sulfur, potassium hydrogen carbonates and Wetcit were carried out in these rows (Figure 5). Though the grapes of these intermediate rows remained surprisingly healthy compared to the untreated control and the standard treatment, we took data from the untreated control, the standard variant and the intermediate rows.

Sprayings in the demonstration and strategy trial				
Nr.	BBCH	Date	untreated Control	organic standard
T1	15	2.6	-	Sulfur
T2	16-19	9.6	-	Dynali
T3	57-59	18.6	-	Talendo
T4	68-71	28.6	-	Sercadis
T5	73	7.7	-	Talendo
T6	75-77	19.7	-	Dynali
T7	79	2.8	-	Topas
Sprayings in the intermediate rows				
Nr.	BBCH	Date	**Products in intermediate rows**	
T1	68-71	30.6	**Vitisan 6 kg+Wetcit 0,2 %+Sulfur 4,8 kg**	
T2	77	28.7.	**Vitisan 10 kg+Wetcit 0,2 %+Sulfur 3,2 kg**	
T3	79	2.8	**Topas 0,32 l+Kumar 5 kg**	
T4	80	9.8	**Vitisan 10 kg+Wetcit 0,2 %+Sulfur 3,2 kg**	
			Vitisan/Kumar = potassium hydrogen carbonate	

Figure 5: Timing and products of spraying in the demonstration and strategy trial and the intermediate rows

3 Results and discussion

The assessment took place two weeks after the last treatment. In order to obtain a very good average of the results, in each replication of the experimental variants, in eight places data has been collected. In total 16 replicates per variant.
Variant11: grape infestation frequency of 99.4% and infestation intensity of 36.7%. Variant 2: grape infestation frequency of 98.9% and infestation intensity of 21.6% (Figure 6).

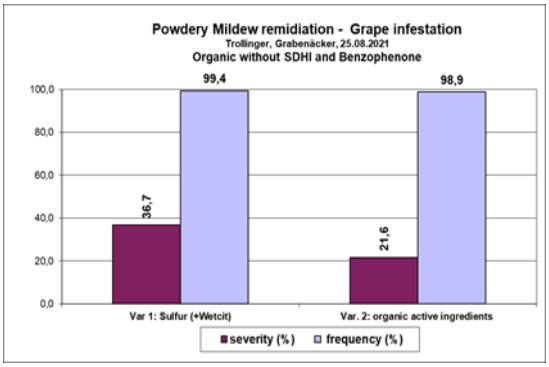

Figure 6: result of the remediation trial

The infestation was lower in variant 2 consisting only agents with organic active ingredients, but as expected, due to the heavy infestation of the previous year, it was not satisfactory in both variants. The remediation trial will be continued in 2022. The result of the parallel running powdery mildew demonstration and strategy trial in Müller-Thurgau was very surprising. Only four treatments with sulfur, potassium hydrogen carbonates and Wetcit were carried out in the intermediate rows. The infestation at the grapes was only 3,1 % severity compared to 46 % in the untreated control and 0.6 % in the standard variant (Figure 7).

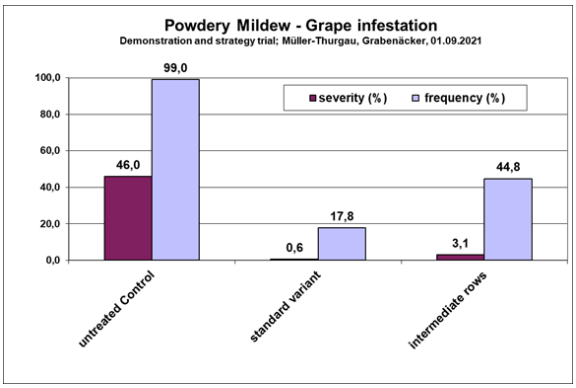

Figure 7: result powdery mildew demonstration and strategy trial

4 Conclusions

This combination of agents (sulfur, potassium bicarbonates and wetcit) could thus be tested as another possibility for rehabilitation. However, the lighter infestation of the previous year and the sensitivity of grape variety to powdery mildew could be responsible for this positive result. In this trial, this could play a decisive role. The result is in any case worth pursuing further.

References

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