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Controlling downy mildew (*Plasmopara viticola*) in field-grown grapevine with some Natural Compounds in Albania

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Abstract: *The investigation was carried out during 2012 seasons in Marikaj in Tirane Capital, Tirane – Durrës desert road under natural infection conditions. The efficacies of Solfato di rame 20%, Algae extract, Clay with Al-sulfate, Algae extract with potassium \ Phosphomat and alternate, against downy mildew were studied on grapevine cv. Merlot. All the tested compounds provided protection at different level against downy mildew [Plasmopara viticola (Berk. et Curtis ex. de Bary) Berl.] on both leaves and bunch as compared with contoll which record the highest effect. Solfato di rame 20%, Alternate, Clay with Al-sulfate and Algae extract with potassium \ Phosphomat were more effective on leaves and bunch as compared with used in a single treatment. All the application programs showed positive effects on cluster weight and other physical traits. Similar effects were found on chemical properties of grapes where, it leads to increase sugar contents and other traits in addition to reducing of total acidity ratio.*

Key words: *Grapevine, Plasmopara viticola, Solfato di rame 20%, Algae extract, Clay with Al-sulfate, Algae extract with potassium \ Phosphomat*

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I. Introduction

The downy mildew of grapevine is one of the most destructive diseases in viticulture resulting in severe epidemics and enormous economic costs. The causal agent is *P. viticola* (Berk. and Curt.) Berl. and de Toni, an obligate biotrophic oomycete of the Peronosporaceae family, which was introduced to Europe from North America in the 1870s [1].

In organic farming, the control of *P. viticola* is based on the use of copper, together with all preventive management measures necessary to minimize the development of disease. Copper is still a very important tool to manage the diseases in conventional agriculture and is actually indispensable in organic farming (24, 21). With Commission Directive 2009/37/EC, copper compounds have been included in Annex I to Directive 91/414/EEC (concerning the placing of plant protection products on the market). "Therefore, it is necessary that

An organic vineyard is a complex living system where the grower actively tries to encourage the self regulation of the ecosystem and the health of this organism. In organic viticulture one of the primary goals is to grow healthy and disease tolerant or resistant plants.

Downy mildew is one of the most harmful grapevine diseases in every European wine growing zone, the epidemics of which can cause tangible damage both to the leaves and to the bunches. The pathogen can infect all of the vegetative organs of the vine such as leaf, tip, flower, cluster, stalk and young fruit, and can cause numerous infections during the season.

Furthermore, the use of pre- and post harvest chemical treatments is increasingly limited due to consumer concerns. So, this study aims to evaluate The efficacies of Solfato di rame 20%, Alternate, Clay with Al-sulfate and Algae extract with potassium \ Phosphomat were more effective on leaves and bunch as compared with used in a single treatment.

II. Materials And Methods

Plant materials:

The investigation was carried out during 2012 seasons in Marikaj in Tirane Capital, Tirane – Durrës desert road under natural infection conditions. The vines were planted in a light calcareous sandy soil and placed at 1.5 m (between vines in the row) x 2.75 m (between rows). The vines were trained to the modified cane training and supported by telephony trellis system. All vines received the same agricultural practices already applied in the vineyard.

Vineyard trials:

The vineyard experiments were arranged in a randomized complete block design with four replications for each variant, four vines for each replicate. The treatment programmers were applied at 15 day intervals during the growing season starting at 10-15 cm shoot length. Tested compounds (Table 1) were sprayed with a Knapsack sprayer. In order to provide a homogeneous spread on the leaf and bunch surface, surfactant triton was added at the dose of 50 ml / 100 L water. Control vines were sprayed with water.

Table 1. Commercial name, active ingredient, dosage and number of applications of the products tested against grape downy mildew

Biofungicides against downy mildew **[***Plasmopara viticola* (Berk. et Curtis ex. de Bary) Berl.]				
No	Chimical trade name	Active ingredient	Formulation	Usage dosage/100 L
1	**Cuprozin fl**	Copper- hydroxide	wp	350gr/100l
2	**Algin Biovital**	Algae extract	liquid	250ml/100l
3	**Muco-Sin**	Clay with Al-sulfate	wp	250gr/100l
4	**Frutogard**	Algae extract with potassium Phosphomat	liquid	250ml/100l

Disease assessment:

The disease severity on leaves and bunches were evaluated 12 days after the last application. Bunch infection was evaluated based on a scale of 0 – 4 (Delen et al. 1987) on 72 bunches for each replication, where 0 = no infection on the bunch (no), 1 = 25% infection (n1), 2 = 50% infection (n2), 3 = 75% infection (n3), and 4 = more than 75% infection (n4).

Leaf infection was evaluated based on a scale of 0 - 3 (Delen et al. 1987) on 150 leaves for each replication, where 0 = no colony on the leaf (n0), 1 = 1 - 2 colonies per leaf (n1), 2 = 3 - 10 colonies per leaf (n2), and 3 = more than 10 colonies per leaf (n3). The experiments were established as randomized complete block design with 4 replications, and 8 plants were used for each plot. Main plots include spraying treatments, while the sub-plots include pruning. The distance between plots was 3 m.

Statistical Date Analysis

Disease severity (%) was evaluated using Townsend-Heuberger formula. The effectiveness of spray programs was evaluated using the Abbott formula, and the resulting data were assessed using Minitab® Statistical Software Release 14. The mean values were compared by Duncan's multiple range test at $P < 0.05$.
The efficiency of chemical and fungicidal treatments was calculated by the following formula: Efficacy of treatment = ((control-treatment)/control) 100, Mousa, *et al*. 2006.

III. Results

Efficacies of application programs:

On disease incidence: The efficacies of test chemical under natural conditions were determined in two seasons. In vineyards, the alternatives substances provided protection. Evaluation of downy mildew **[***Plasmopara viticola* (Berk. et Curtis ex. de Bary) Berl.] Imc in leaf and bunch was made on 25.07.2012 where the data Starting points are given in Table 2 and Figure 1, 2 and grafic 1.

Table 2 and Graph 1 show that the index of downy mildew **[***Plasmopara viticola* (Berk. et Curtis ex. de Bary) Berl.] he was in Marikaj Tirane . In leaves (Imc) varies from 11% and 14 % Respectively in Variants where chemical treatments were performed with Cuprozin fl and Alternation and up to 75% in the control variant (ie without treatment) with a difference of 66 %

We compare this with the vascular disease index (Plasmopara viticola (Berc and Curt) in coats where Imc ranges from 7 and 11% respectively to variants where chemical treatments are performed with Cuprozin fl and Muco-Sin and up to 60 % In the control variant (ie without treatment) With a difference of 53%

Table 2. On Evaluation of the Influenza Index (Imc in%) on leaves and bunch against the downy mildew **[***Plasmopara viticola* (Berk. et Curtis ex. de Bary) Berl.] he was in Marikaj Tirane

Assessment	**stnemtaerT**	**xednI sesaesiD**				**∑Imc -jaP1+P2+P3+P4**	**Disease severity** %	**Efficacy %**	**Dunnett's Test**
		P1	**P2**	**P3**	**P4**				
Assessment in the leaves	Cuprozin fl	9	10	10	13	42	11	a	CB
	Algin Biovital	20	17	18	15	70	18	b	DC
	Muco-Sin	16	17	15	19	67	17	b	B
	Frutogard	20	19	17	17	73	18	b	ED
	Alternim	15	13	15	12	55	14	ab	E
	Kontroll	76	76	74	75	301	75	c	A

	Shuma	156	152	14 9	15 1	608	153		
	Mesatarja	**26**	**25.3 3**	**24. 83**	**25. 16**	**101.33**	**25.5**		
	DMV =2.76150 per @=0.05								
Assessment in the bunches	Cuprozin fl	5	7	10	6	28	7	a	B
	Algin Biovital	15	12	13	14	54	14	b	C
	Muco-Sin	11	12	10	12	45	11	b	B
	Frutogard	16	13	15	11	55	14	c	DC
	Alternim	8.3	7.3	9.5	7.2	32.30	8.08	a	D
	Kontroll	66	56	64	55	241	60	d	A
	Shuma	121. 3	107. 3	12 1.5	10 5.2	455.3	114.08		
	Mesatarja	**20.2 1**	**17.8 8**	**20. 25**	**17. 53**	**75.88**	**19.01**		
	DMV =2.76150 per @=0.05								

*The **Dunnett's** Test at a level of 5% of probability was applied. The averages followed by the same letter do not differ statisticaly between themselves

Table 3. Variance Analysis (ANOVA) on the Evaluation of the Diseases Index (Imc in%) on the leaf and bunch against the downy mildew **[***Plasmopara viticola* (Berk. et Curtis ex. de Bary) Berl.] he was in Marikaj Tirane

Assessment	**Variation Source**	**Df***	**Square Sum**	**Mean Square**	**Statistics of the test**		
					F. actual	**< F theory >**	
						95%	**99%**
Leaf	**Treatmennts**	5	12124.33	2424.867	852.4922**	2.9012	4.5556
	Replications	3	4.333333	1.444444	0.507813 NS	3.2873	5.4169
	Error	15	42.66667	2.844444			
	Total variation	23	12171.33				
Bunch	**Treatmennts**	5	8331.152	1666.23	265.6817**	2.9012	4.5556
	Replications	3	38.62458	12.87486	2.052907 NS	3.2873	5.4169
	Error	15	94.07292	6.271528			
	Total variation	**23**	**6708.625**	-	-	-	-

*Df = Degree of freedom ** Significative at a level of 1% of probability ($p < .01$) * Significative at a level of 5% of probability ($.01 =< p < .05$) ns Non-significative ($p >= .05$)

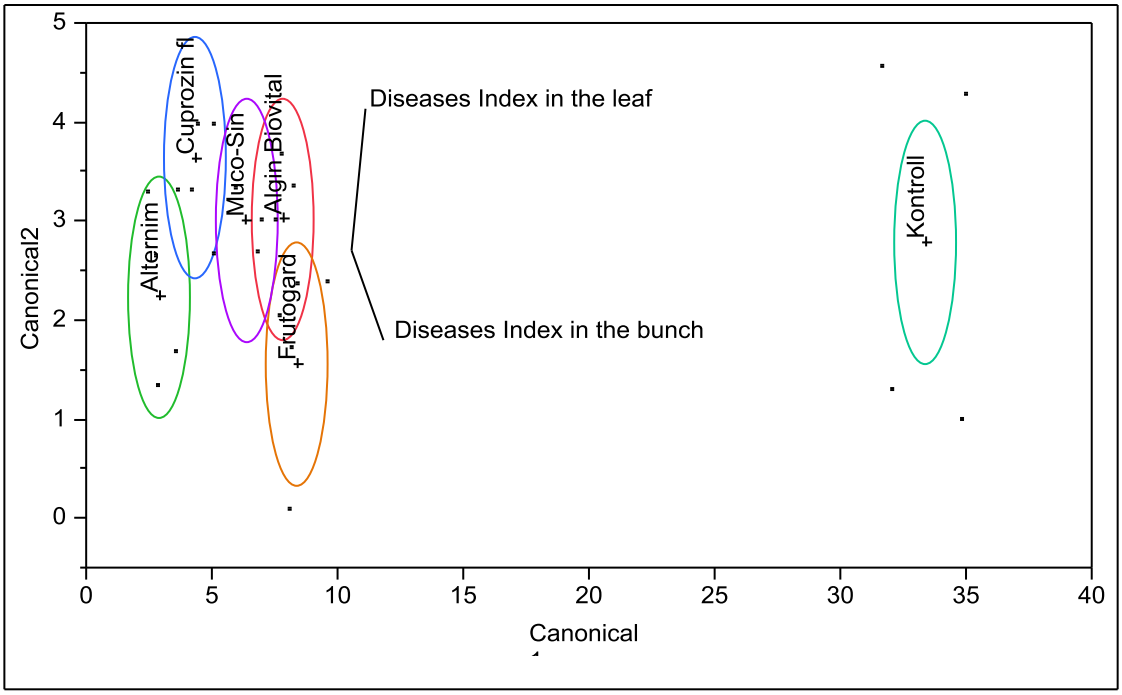

Figure 1 Canonical plot for Diseases Index in leaf and bunch for against the downy mildew **[***Plasmopara viticola* (Berk. et Curtis ex. de Bary) Berl.] he was in Marikaj Tirane

From the data from Table 3 that brings variance analysis (ANOVA) using the statistical program ASSISTAT (2017) for disease index (Imc in%) on leaves and in coating against downy mildew **[***Plasmopara viticola* (Berk. et Curtis ex. de Bary) Berl.] he was in Marikaj Tirane

For the farm in the village of Marikaj in Tirana in 2012 shows that between the treatments there are statistically verified changes.This is proved by the values of the "F" values for the treatments which results Be greater than the value of the theoretical table F under Fisher for both levels of authenticity P = 0.05 and P = 0.01. By comparing the factual repeat Fs with the tabular results, the repetitions do not yield statistically verified differences for both levels of authenticity P = 0.05 and P = 0.01 because the factual "F" results to be smaller than The theoretical "F" that shows that our experiment is set up in the correct conditions and allows us to proceed further with of the data analysis.

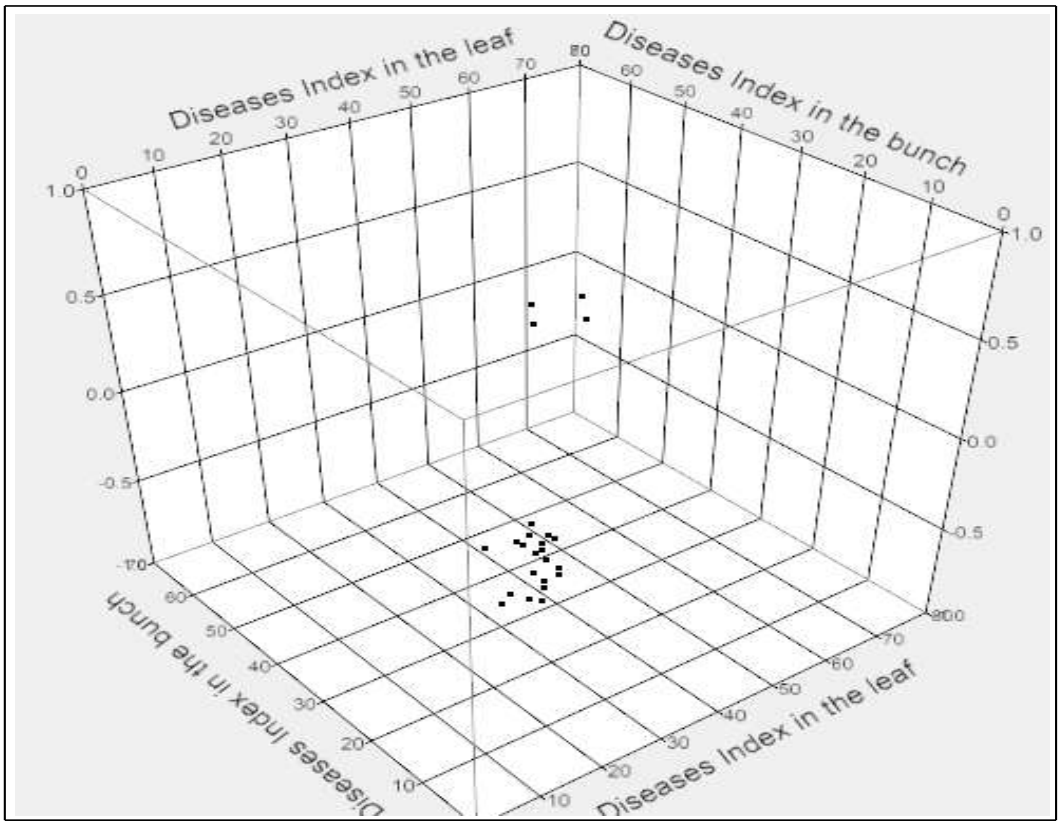

Figure 2 Diagrams Boxing (variances, standard deviation and average Imc in%) for the Diseases Index in leaf and bunch for downy mildew **[***Plasmopara viticola* (Berk. et Curtis ex. de Bary) Berl.] he was in Marikaj Tirane

IV. Conclusions

Based on the results presented above in the terms of a Bio farming all tested products have been effective in controlling for downy mildew **[***Plasmopara viticola* (Berk. et Curtis ex. de Bary) Berl.] The best results under our experiment were those with the copper-based formulation Cuprozin fl ,Muco-Sin and the one with alternation (where all the biofungicides in the study were alternated). But seeing the results of natural prodigies like Muco-Sin, Algin Biovital and Frutogard are able to control well the vultures of vines downy mildew **[***Plasmopara viticola* (Berk. et Curtis ex. de Bary) Berl.]

References

[1]. **Abbott, W.S. 1925.** A method of computing the effectiveness of an insecticide. *Journal of Economic Entomology*, 18: 265-267.
[2]. **AGRIOS, G.N. 2005**. Plant Pathology. Fifth ed. Elsevier Academic Press, London
[3]. **ASSISTAT (2013**) - Website http://www.assistat.com By Francisco de A. S. e Silva DEAG-CTRN-UFC.
[4]. **COOKE, BM, (2006)** Disease assessment and yield loss. In: *The Epidemiologyof Plant Diseases.*
[5]. **Commission of the European Union. 2009.** Commission Directive 2009/37/EC. *Offi cial Journal of the European Union*, L 104: 23-27.
[6]. **DURAJ, N; Th. RUCI. 2005.**Demtuesit dhe semundjet e hardhise. (MBUMK) 2005 faqe 54-64
[7]. **Hasani, M. 1998** "Fitopatologjia Bujqesore", UBT, Tiranë
[8]. **KALTANI, T; ÇELO, B.1982.** Botim i Institutit te Larte Bujqesor faqe 292-302
[9]. **Mckinney. H. H. 1923**. A new system of grading plant diseases. Jurnal of Agricultural Research.26; 195-218.

[10]. **RUCI, Th. Vrapi.H.2011** Studimi i çfaqjes se epifitise, perllogaritja e shpenzimeve dhe organizimi i trajtimeve ne luften kunder vrugut te hardhise. Teme diplome, 1-35
[11]. **Susuri.L.1995 .** Fitopatologjija .Prishtine. faqe 116-122
[12]. **SAS Institute Inc. 2009**. *JMP® 8.02 Design of Experiments Guide, Second Edition*.Cary, NC

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