penergetic p

penergetic
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# Anwendungsbericht/User Application Report

**Produkt/Product:**
penergetic p

**Anwender/User:**
Federal College for Viticulture and Fruit-Growing
Klosterneuburg/Austria

**Fachberater/Consultant:**
Christof Weber
Weber Agrartecnik/Austria

**Datum/Date:**
June 2014

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## Application on wine in Austria

**Effect of Stone Meals on the Sensory Parameters of Wine carried out at Federal College and Federal Office for Viticulture and Fruit-Growing Klosterneuburg**.

### Diploma Thesis submitted by Marius Pimpel

On the subjects of

- plant protection (with exercises)
- Wine and fruit growing technological laboratory (viticulture)

Variety: Green Veltliner

### Effect of Plant Tonics / Fortifiers

Plant tonics have no direct effect on harmful pathogens, but simply strengthen the resistance of the plant against pathogens (HARMS AND WALTER, 2008).

The main modes of action of plant tonics are increased plant resistance, promotion of rooting, growth and flowering, increase of yield, promotion of soil organisms and activation of existing nutrients and components. By judicious use of plant tonics a prevalence of pathogens is prevented (HOFMAN, 1995).

If used properly, the result should be healthier and better-growing plants, reduced losses and increased flower formation (HALL MANN, 2007) (Mohr, 2005).

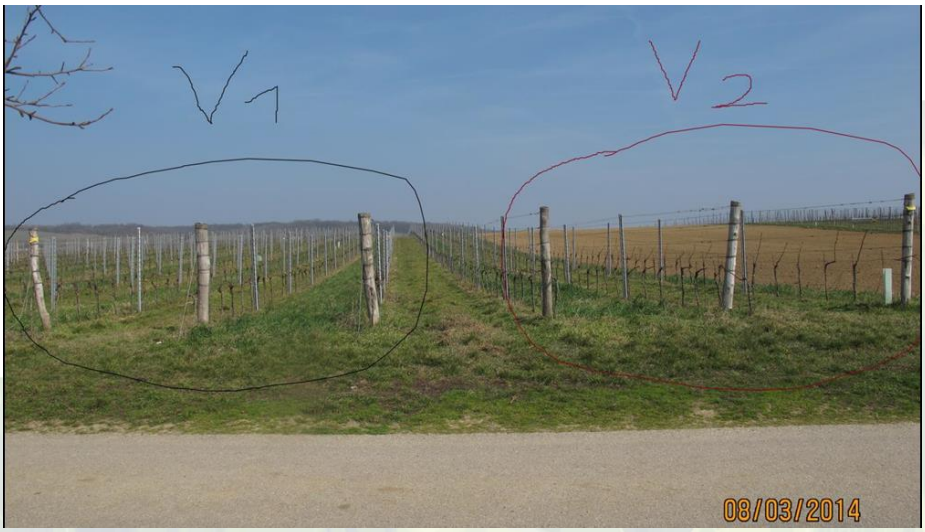
The resistive power of the plants is based on either the activation of plant defense mechanisms or by the hardening of tissue (HARMS AND WALTER, 2008).

Plant tonics must be used preventively in several applications, since they have no direct effect against pathogens (HALL MANN, 2007).
The plant-strengthening effect is difficult to verify scientifically in most cases (HARM, 2010).
In the fight against decay plant tonics achieve similar results as unilateral leaf removal in the grape zone or like fungicides with additional Botrytis effect. There is currently no reliable evidence of a strengthening of the grape skin through treatment with plant tonic (HARMS AND WALTER, 2008).
In addition to resistance-inducing properties a direct effect against certain stages of fungi development has been observed with some plant tonics (HARM, 2008).

## Sprayings in the Vineyard

At vineyard Walter Glatzer in Göttlesbrunn (wine-growing area Carnuntum) initially 2 plots with each 3 rows and per row 5 upstanding lengths were marked and separated out for the thesis trial. Each row contains 30 vines. The rows are labeled at the upper end so that the winery does not spray the trial area.
Then Michael Pimpel of Bayer Cropscience and Christof Weber of Weber Agrartechnik made a spraying plan for each plot.

The trial area is on a slight southern slope with sandy loess and subsoil of gravelly loam.
To the left (variant 1): The rows are treated with standard (100%) amounts of pesticides.
To the right (variant 2): The rows are treated with 30% less pesticides + informed stone meals.
When pesticides were reduced due to favourable weather conditions, etc. the reduction was done equally in both lots. The amounts of stone meal were 7 g per treatment except for the spraying with 9 g at the time of budding.



*Left V1, right V2*

## Spraying Plan 2013 Marius Pimpel, Göttlesbrunn

| Spraying | Pesticide | V1, Amount Standard IP | V2, Amount Penergetic | Reason | Date |
|---|---|---|---|---|---|
| 1. Spraying | Netzschwefel Stulln | 4 kg/ha – 75 g plot | 3 kg/ha – 50 g + 9 g penergetic p/plot | Leaf curl & mites | 27/04/13 |
| 2. Spraying | Netzschwefel Stulln | 4 kg/ha – 45 g/plot | 30 g/plot + 7 g penergetic p | Oidium | 09/05/13 |
| | Ortho Phaltan 500 SC | 1 lt./ha – 30 ml/plot | 20 ml/plot | Peronospora | 09/05/13 |
| | Envidor | 9 ml/plot | 6 ml/plot | Mites | 09/05/13 |
| 3. Spraying | Collis | 0.4 lt./ha – 9 ml/plot | 6 ml/plot + 7 g penergetic p | Oidium/Botrytis | 24/05/13 |
| | Profiler | 1,5 kg/ha – 40 g/plot | 30 g/plot | Peronospora | 24/05/13 |
| | PH-Opti | 0.2 ml/100 lt. 10 ml/5 ml | 0.2 ml/100 lt. 10 ml/5 ml | Miscibility | 24/05/13 |
| 4. Spraying | Collis | 0.4 lt./ha – 9 ml/plot | 6 ml/plot + 7 g penergetic p | Oidium/Botrytis | 08/06/13 |
| | Profiler | 1,5 kg/ha – 40 g/plot | 30 g/plot | Peronospora | 08/06/13 |
| | PH-Opti | 0.2 ml/100 lt. 10 ml/5 ml | 0.2 ml/100 lt. 10 ml/5 ml | Miscibility | 08/06/13 |
| 5. Spraying | Luna Experience | 0.2 lt./ha – 8 ml/plot | 6 ml/plot + 7 g penergetic p | Oidium | 21/06/13 |
| | Melody Combi | 2.0 kg/ha – 50 g/plot | 2.0 kg/ha - 35 g/plot | Peronospora | 21/06/13 |
| 6. Spraying | Runner | 0.4 lt./ha – 9ml/plot | 0.4 lt./ha – 6 ml/plot + 7 g penergetic p | Tortrix, moth | 05/07/13 |
| | Prosper | 0.8 lt./ha – 18 ml/plot | 0.8 lt./ha – 12 ml/plot | Oidium | 05/07/13 |
| | Melody Combi | 2.0 kg/ha – 50 g/plot | 2.0 kg/ha - 35 g/plot | Peronospora | 05/07/13 |
| 7. Spraying | Prosper | 0.8 lt./ha – 18 ml/plot | 0.8 lt./ha – 12 ml/plot + 7g penergetic p | Oidium | 18/07/13 |
| | Ortho Phaltan 500 SC | 1 lt./ha – 30 ml/plot | 20 ml/plot | Peronospora | 18/07/13 |
| | Runner | 0.4 lt./ha – 9ml/plot | 0.4 lt./ha – 6 ml/plot + 7 g penergetic p | Tortrix, moth | 18/07/13 |
| 8. Spraying | Prosper | 0.8 lt./ha – 18 ml/plot | 0.8 lt./ha – 12 ml/plot | Oidium | 05/08/13 |
| | Melody Combi | 2.4 kg/ha – 50 g/plot | 2.0 kg/ha - 35 g/plot | Peronospora | 05/08/13 |
| 9. Spraying | Prosper | 0.8 lt./ha – 18 ml/plot | 0.8 lt./ha – 12 ml/plot | Oidium | 16/08/13 |
| | Melody Combi | 2.4 kg/ha – 50 g/plot | 2.0 kg/ha - 35 g/plot | Peronospora | 16/08/13 |

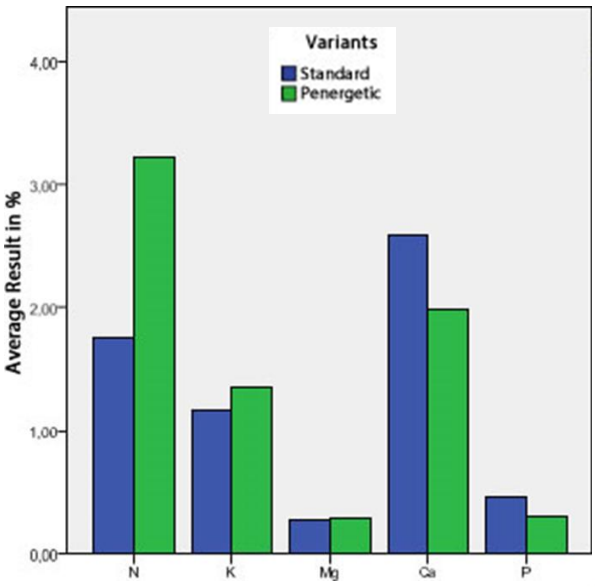
Application was done using a motorized sprayer (petrol), provided by the trial farm. The objective was to apply the products directly and make them stick to the leaves as well as possible.

## Evaluation of Measurement of Nutrient Content and Trace Elements

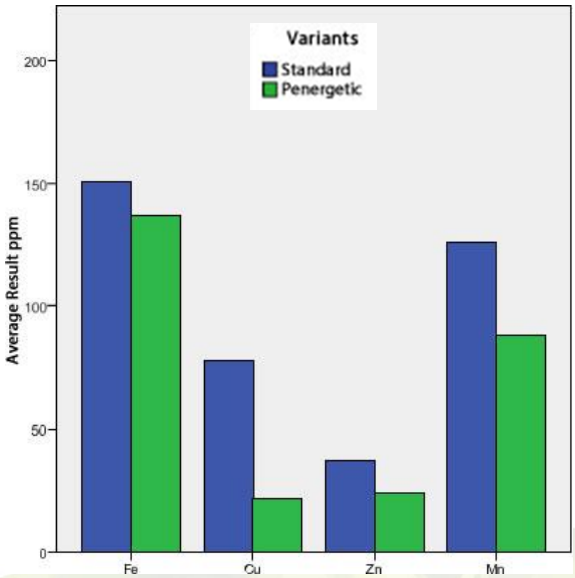
**Leaf sampling June 21/2013**

**Nutrients**: At the first time of leaf sampling (outgoing blossom) it is striking that the nitrogen content of the plant in variant 2 is clearly higher than in variant 1. Potassium is slightly higher in variant 2. Calcium could have been more in version 2 before the rainfall. Otherwise there is no significant difference in other nutrients.

**Trace elements**: The values of iron and manganese are significantly higher in variant 1 than in variant 2. A big difference between the variants can be seen in copper. In this phase the values of the standard variant generally dominate.
Since a lot of nitrogen was used for building chlorophyll in variant 2, it can be assumed that the trace elements were also consumed in the process.




***Plant nutrients***

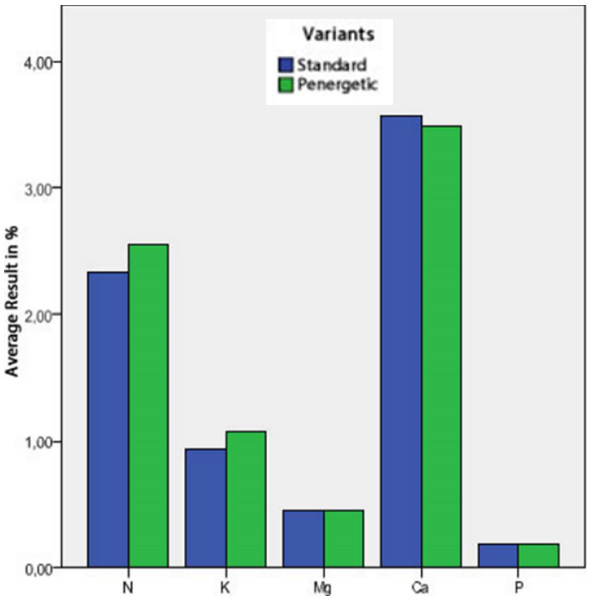



***Trace elements***

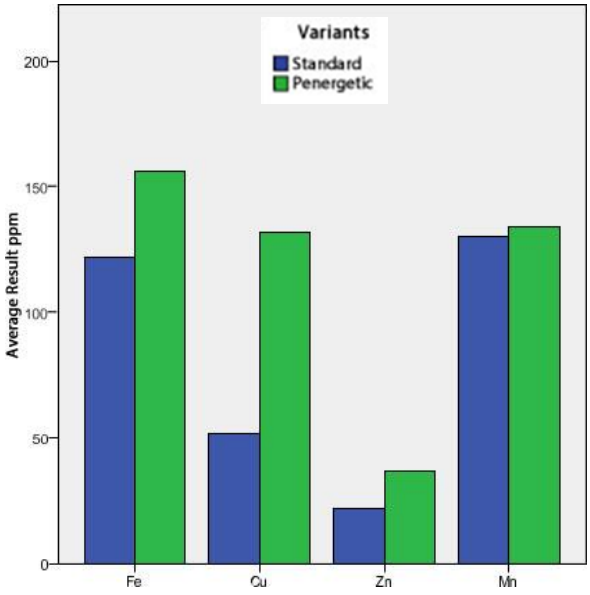
**Leaf sampling August 17/2013**

**Nutrients**: The second leaf sampling (veraison) showed a high, but equivalent amount of calcium in both variants. Nitrogen was used for chlorophyll synthesis. Potassium, magnesium and phosphorous were balanced.

**Trace elements**: This looks different, though. Here variant 2 dominates again, in particular regarding copper. Trace elements are replenished for the formation of chlorophyll.




***Plant nutrients***

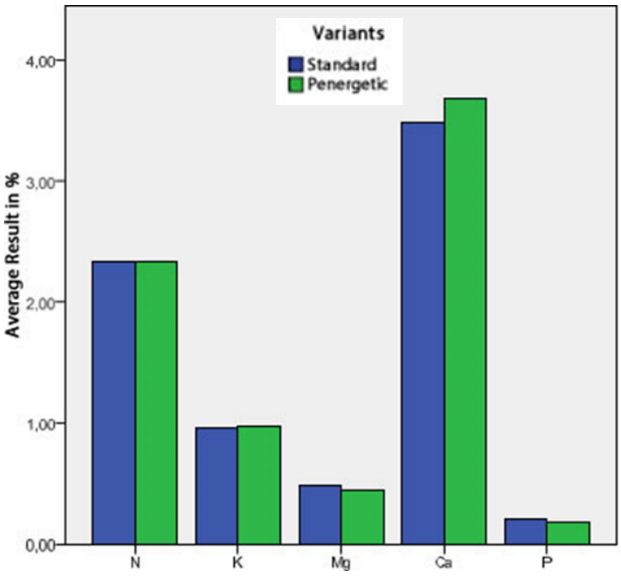



***Trace elements***

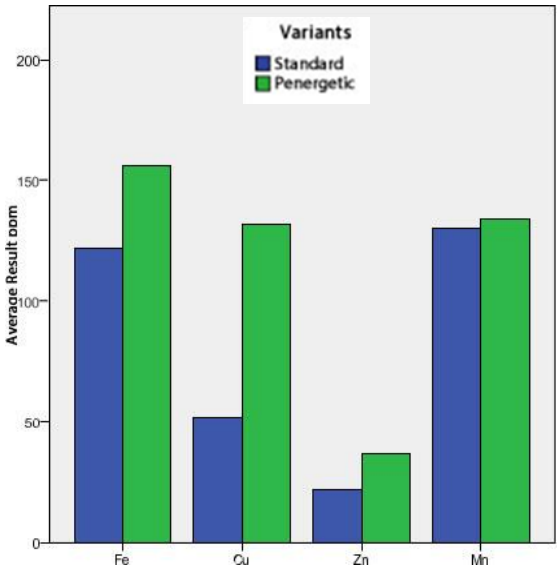
**Leaf sampling 1. September 2013**

**Nutrients**: At the third leaf sampling that took place around the start of full ripening did not show any greater changes. The calcium content rose and was even a bit higher in variant 1 than in variant 1. One could see that the grapes in variant 2 appeared riper.

**Trace elements**: The values of copper and zinc decreased in variant 2. Otherwise the values remained rather the same.



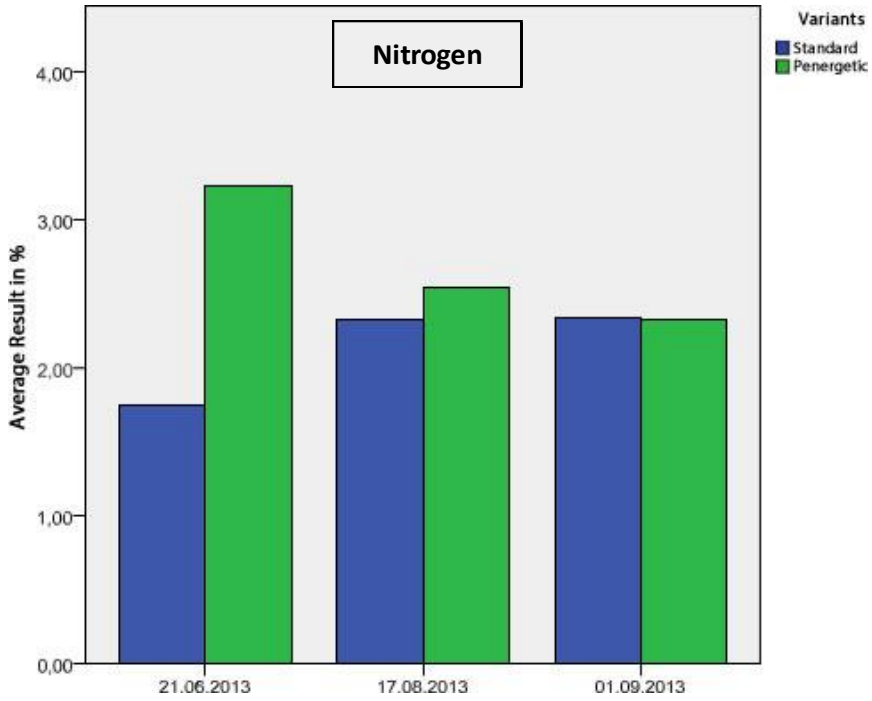

***Plant nutrients***




***Trace elements***

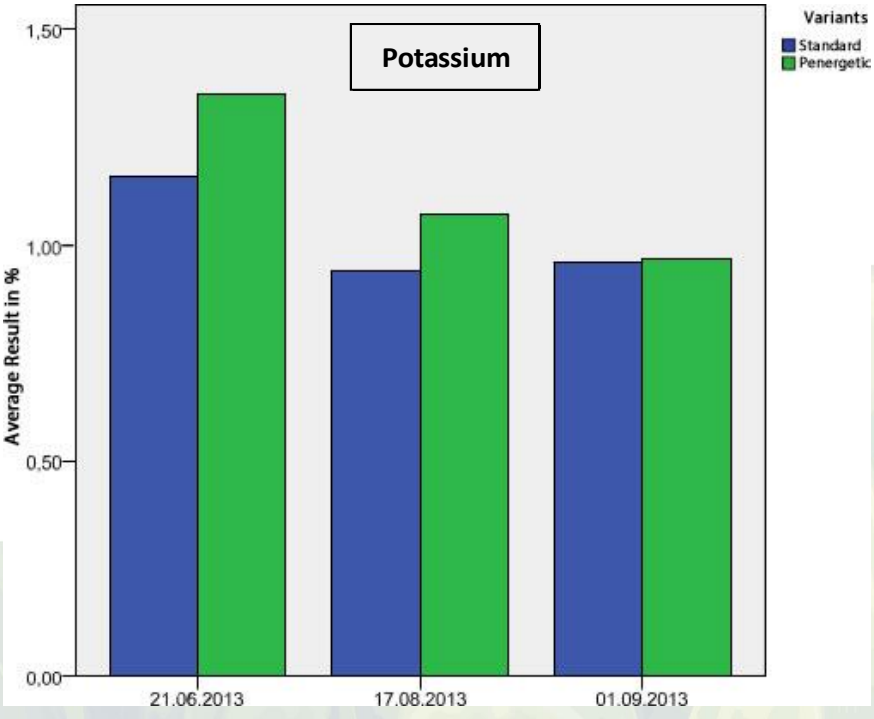
## Comparison trace elements

**Nitrogen**




**Potassium**

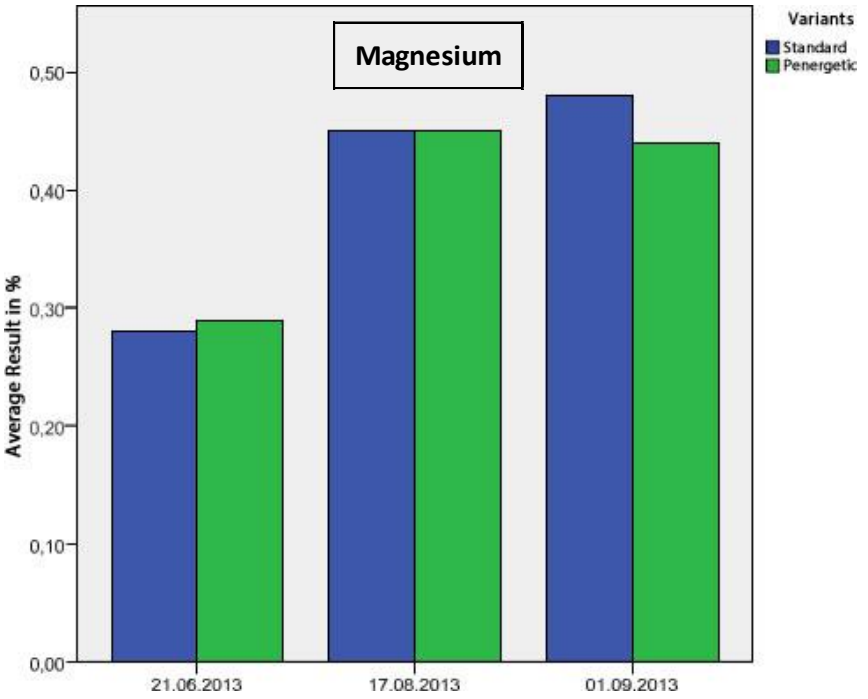
Sufficient potassium is a prerequisite for cell division and growth. Potassium is also important for absorption of water by the roots. And the Stomata are controlled better so that CO2 is easier absorbed for formation of chlorophyll.



**Magnesium**

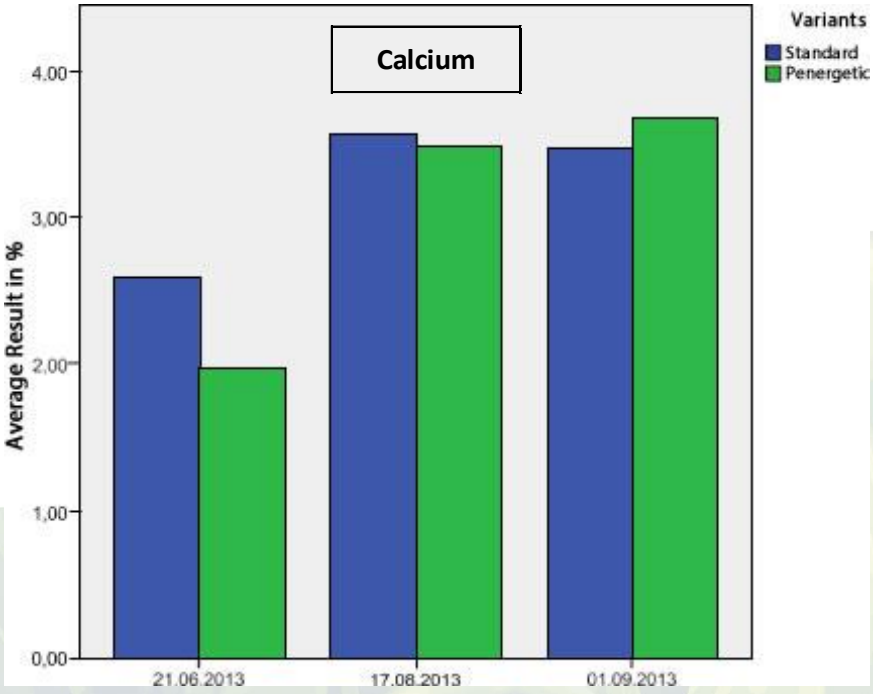
The magnesium values were initially low, but rose in both variants towards vintage. There was a slight increase in variant at the last sampling.

Magnesium is important for the formation of chlorophyll and counteracts stem necrosis.



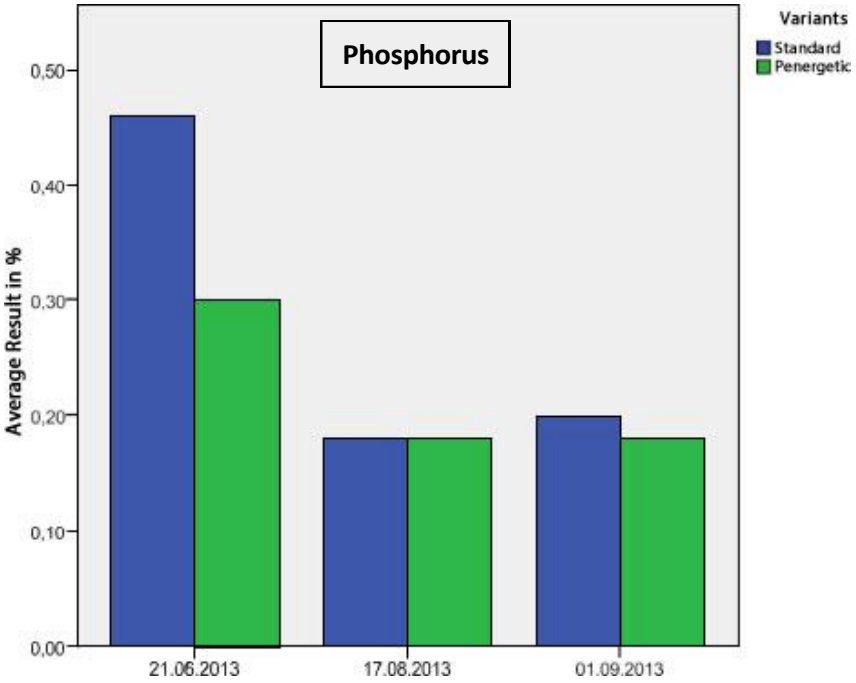

**Calcium**

At the two later samplings it is going in the direction of lignification / maturity of the wood where increased calcium is needed.



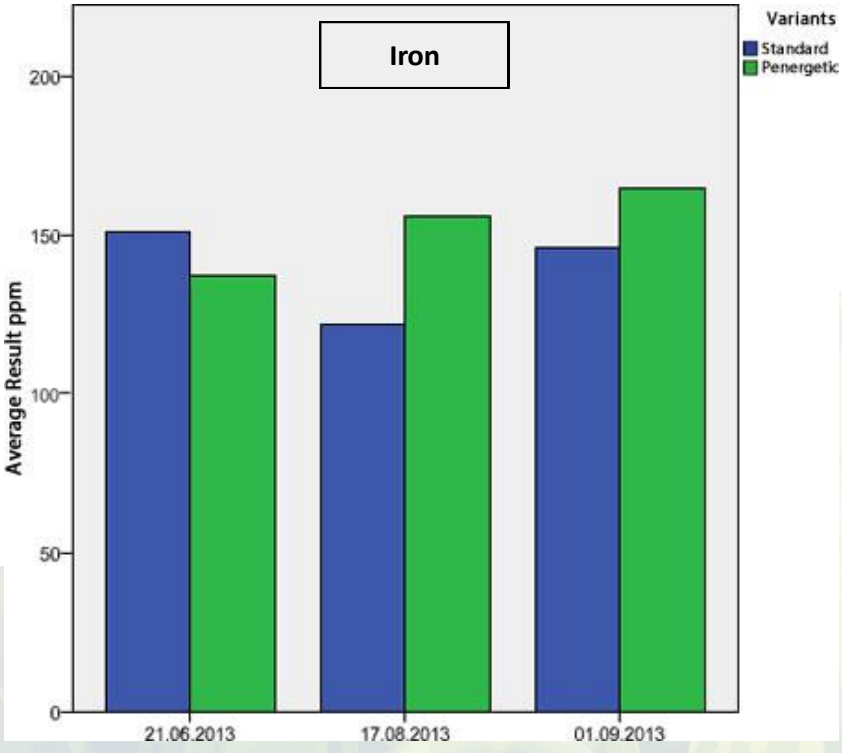
**Phosphorus**

In the first sampling there is a significant difference of phosphorus in variant 1 to variant 2. At the two following samplings there is hardly any difference.



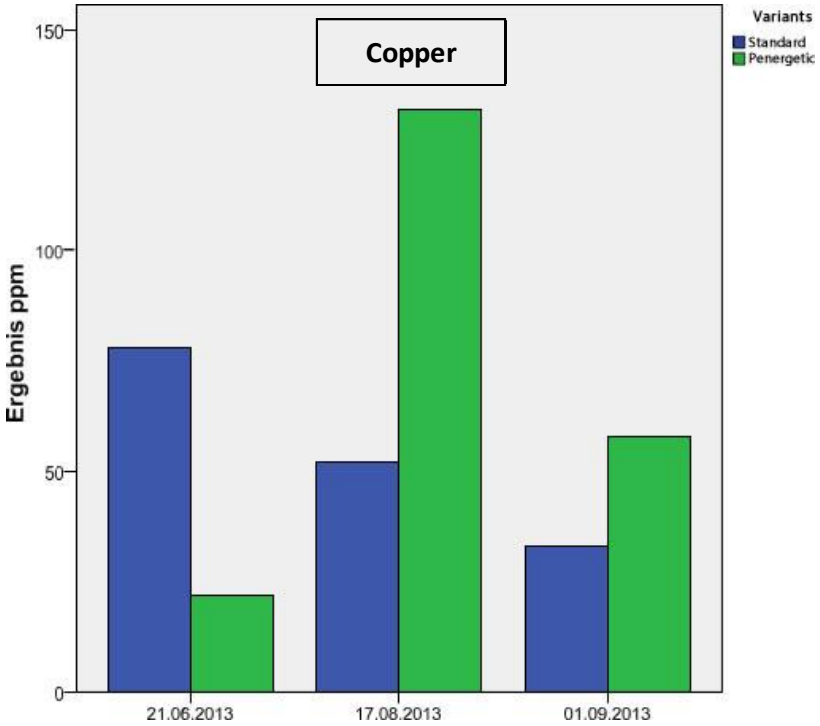

**Iron**

It can be assumed that variant 1 starts later with formation of chlorophyll due to the cold weather before the first sampling.



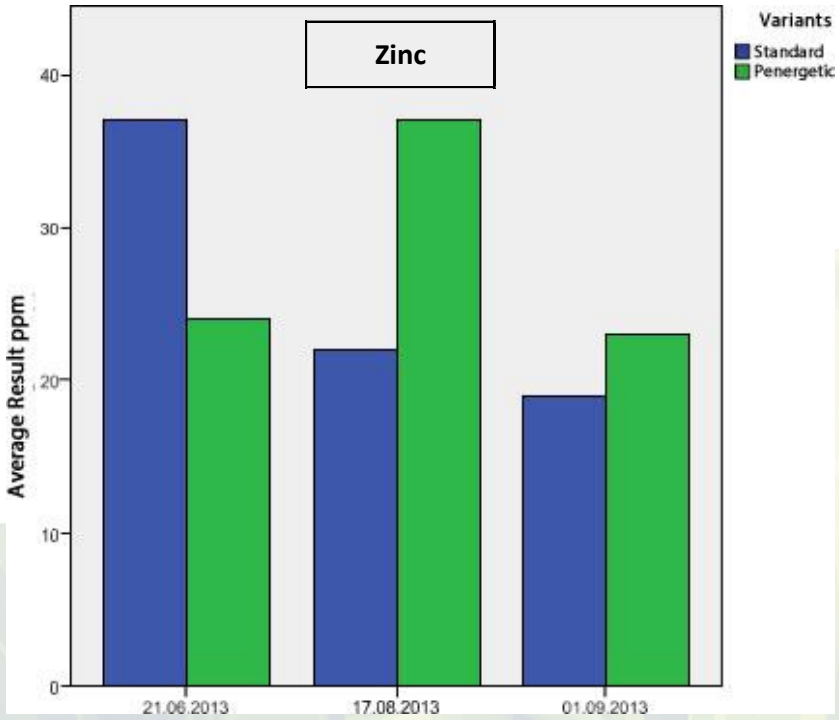
**Copper**

At the first sampling more copper is used in building amino acids, as a lot of nitrogen is available for the formation of chlorophyll.



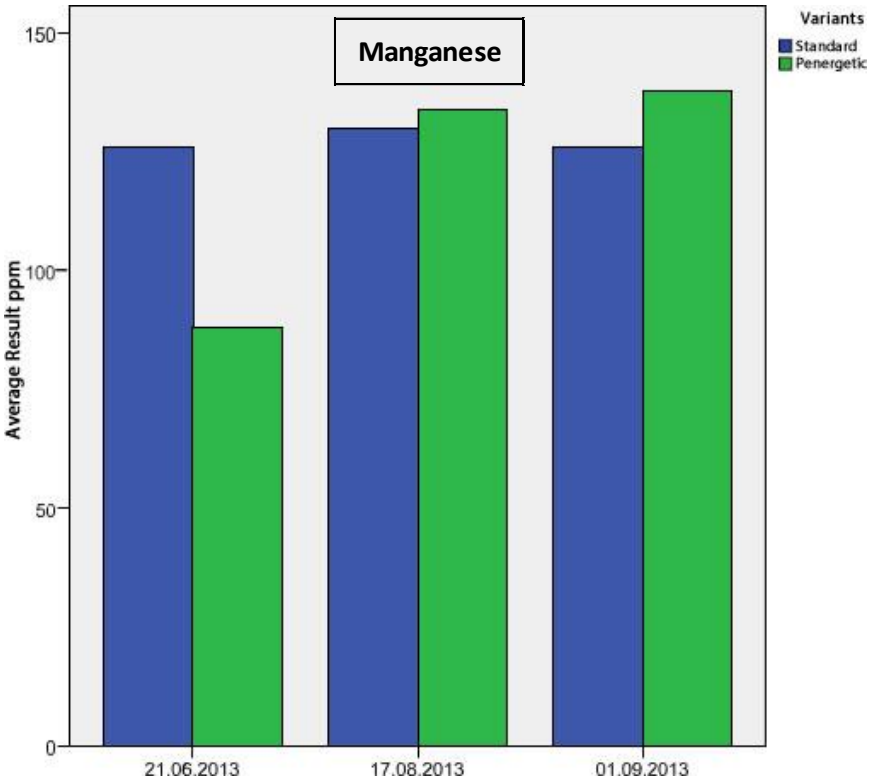

**Zinc**

At the initial sampling the reason would also here be the formation of chlorophyll where zinc is an essential factor.



**Manganese**

Again, it can be assumed that manganese is consumed for the formation of chlorophyll.



## Discussion

Sustainability in crop protection is becoming a more and more important subject. Pesticides should be reduced and the environment should be protected, but at the same time high quality, healthy wine should end up in the wine glass of the consumer.

Great numbers of plant protection strategies are continuously being developed in order to not pollute the environment too much. Pesticides are reduced, sprays are skipped, but also weather stations and sophisticated programs like Vitimeteo are used to calculate the severity of attacks in order to achieve targeted applications. Unfortunately, as it was the case in 2013 with Oidium, with varying degrees of success.

In this thesis the attempt was made to compare a normal plant protection variant, treated as per normal IP praxis, to a variant that was treated with 30 percent less pesticides and strengthened by informed stone meal.

The first major objective, support for maintaining the health of the vines, could be achieved as the grapes of the special variant were very healthy all the way till harvesting. It even went so far that the special version without Botrytis could be harvested in good condition whereas some rotting berries had to be removed in the IP variant.

The stone meal has a similar effect as potassium silicate of hardening the skin of the berries and therefore less occurrence of Botrytis. This was already confirmed by "HARMS and WALTER 2008".

The second major objective (according to "WEBER 2005") was the propagated effect of these informed stone meals: increase of chlorophyll and photosynthesis performance for which increased nitrogen, but also trace elements are needed, could be demonstrated impressively by leaf sample measurements. Equally important in this comparison, according to "WALTER HARMS and 2008", is better health of the "informed" grapes over the IP grapes.

As determined at the multiple tastings of the separately vinified batches, there were no differences between the wines except for small nuances. But the wine is young and the wines of 2013 generally develop rather slowly. So one would have to await the further development with age and then compare again.

At any rate, this plant protection comparison trial - including vinification - is a pointer in the direction of developing sustainable plant protection and an option to strengthen plant health and inherent resistance of the plants against fungi as well as reducing chemical pesticides considerably.

**Viticulture will not be able to do completely without chemical products – especially in difficult years – but with the plant fortifying effect of the informed stone meals a new direction can be taken.**

## Summary

In modern plant protection various strategies have been tried and tested over and over again to protect plants successfully against a number of diseases. Moreover, it is a further challenge to use as small quantities of plant protection agents as possible, which is partly facilitated by the use of fungus-resistant varieties, which require far less plant protection. Thus, with questions of sustainability arising, this topic is gaining importance.

This diploma paper has investigated if lower amounts of chemical plant protection agents could be used, if their effect is enhanced by the use of stone meals, which affect the plant similarly to plant fortifiers. The question arising is, if the plant can thus be protected as well against common diseases as with an ordinary IP concept.

A further consideration was if this more sustainable variant would enable the producer to receive an equally good or even fruitier product. A rating for diseases and nutrient analysis of the leaves should reveal any differences between the variants. Especially a testing for nitrogen contents, which play a crucial role in photosynthesis showed clear results.

**At harvest it was striking that with the IP variant some diseased berries had to be removed from the clusters, whereas this was not necessary in the variant treated with rock flours and lower amounts of synthetic spraying agents.**

Apart from that there were no significant differences between the variants, which can be judged as positive, since it reveals that lower expenditures regarding synthetic spraying agents combined with biological strengthening of the plants can lead to a healthy crop and consequently good wine.

If spraying passes are not reduced, but the amounts of spraying agents used per pass can be reduced by the support of the rock flours, it is possible to not only boost photosynthesis, leading to healthy and vital plants, but also to tread new ways of sustainability in viticulture.