# FIELD INVESTIGATIONS ON THE EFFECT OF NEEMAZAL-T/S (3 L/HA) ON THE GRAPE LEAFHOPPER *EMPOASCA VITIS* (GOETHE) IN VITICULTURE

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## Abstract

In 1997 a field trial was conducted at Deidesheim/Pfalz to investigate the effect of NeemAzal-T/S on the second generation of the grape leafhopper *Empoasca vitis* (Goethe) in viticulture. In August two applications were carried out with an interval of one week. The efficacy of NeemAzal-T/S (0,3%) against larvae and nymphs of *Empoasca vitis* reached between 44% and 62%, which is in general not sufficient enough to control this leafhopper in vineyards.

## Introduction

*Empoasca vitis* (Goethe) is known to be a native inhabitant of German vineyards. Since the beginning of the 90´s the grape leafhopper has become an increasing problem building up high population densities and spreading in most viticultural regions, with a striking emphasis on warmer areas like the „Pfalz“ or „Baden-Württemberg“. The reasons for this phenomenon are unknown. One could possibly be the long periods of hot and dry weather during summer/fall of the years 1990 until now, offering superb living conditions for this thermophilic species. Especially the second larval generation, which normally appears from July to the end of August, can cause severe damage on vine leaves having negative influence on the ripening of the grapes.

At present no chemical agents are registered in German viticulture to combat the grape leafhopper. In 1997 at the SLFA Neustadt investigations were started to get to know more details on the biology as well as the biological and chemical control of *Empoasca vitis*. A screening was started to check different chemical and biological compounds against this pest. One of the products tested was the biological insecticide NeemAzal-T/S (3 L/ha). The insecticidal ingredients (mainly Azadirachtins) can be found in seeds of the neem tree *Azadirachta indica* A. Juss. In many trials these agents have shown to be highly efficient in controlling a large number of pest specimens (Schmutterer 1995). During a field trial in 1997 the potential effect of NeemAzal-T/S (3 L/ha) was examined on the second generation of *Emposaca vitis*. Furthermore the correlation between leafhopper-infestation and quality of harvest was investigated.

## Material and Methods

### *Trial site*

The field experiment was carried out in a vineyard at Deidesheim, which belongs to the viticultural region of the „Pfalz“. Details concerning the test site are summarised in Table 1. The vineyard was situated near the slopes of a forest („Pfälzer Wald“). It was managed according to the guidelines of integrated pest management.

**Table 1:** Trial site

| | |
|---|---|
| location: | Deidesheim/Pfalz |
| area (hectare): | 0,3 |
| length (m): | 120 |
| width (m): | 25 |
| vine-variety: | Spätburgunder<br>Regent |
| planting date: | 1989 |

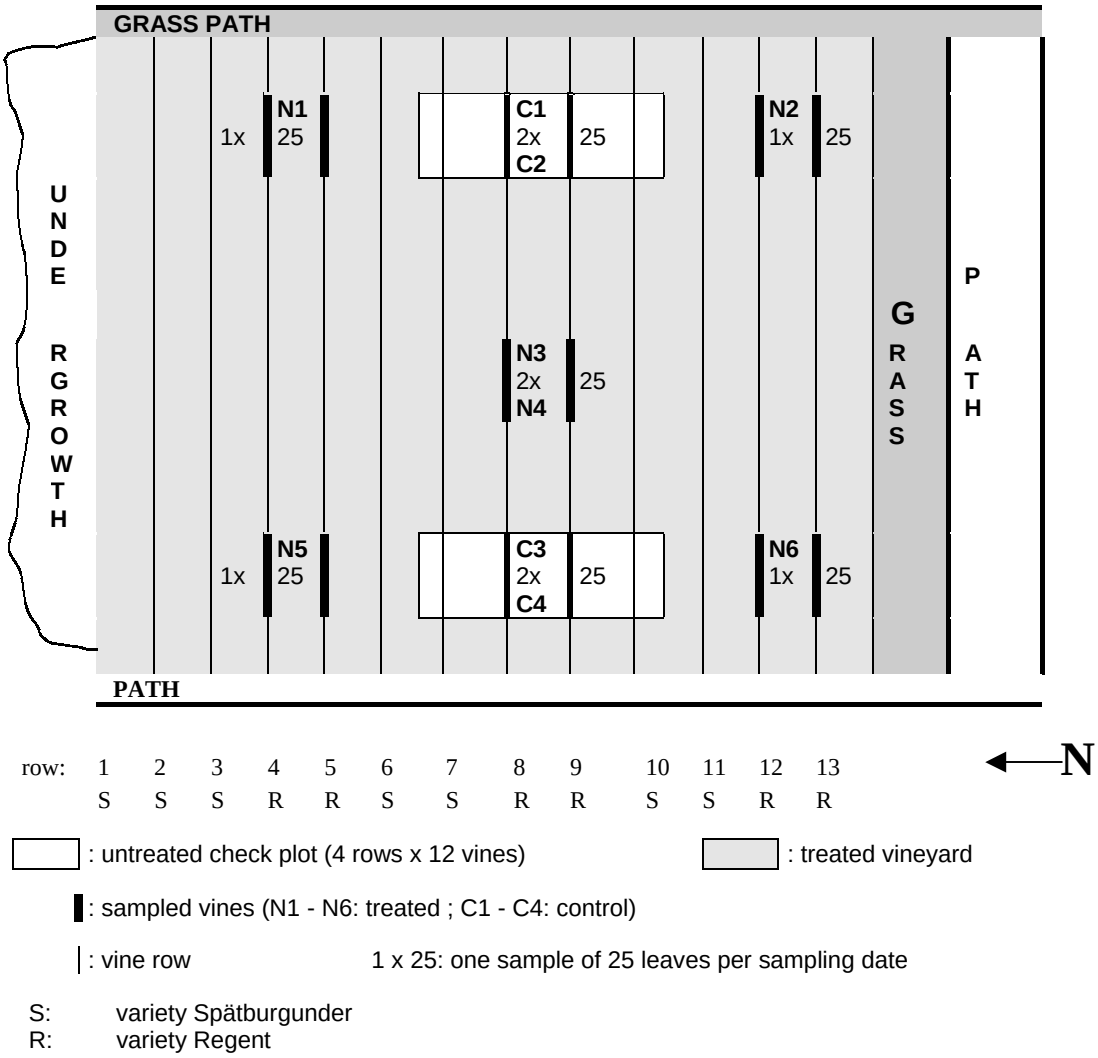


**Figure 1:** Design of the trial site and the sampling places, Deidesheim/Pfalz, 1997

### *Application*

NeemAzal-T/S was applied two times: the first application ($T_1$) was conducted on

05.08.97 (vines: BBCH-code stage about 75-77), the second application ($T_2$) one week later on 13.08.97 (vines: BBCH-code stage 75 - 81). Both applications were carried out with commercial equipment using 1000 l/ha of water. The two control plots were left untreated (see Figure 1).

### *Sampling*

Each sample consisted of 25 mature leaves always collected from the same insertion levels (lower, medium and upper parts of the vines). Immediately after collection the leaves were put into containers partially filled with water and a little detergent. The evaluation was carried out by using a special washing method.

Before the two NeemAzal-T/S-applications between 1st of July and 4th of August 8 samplings each on 6 different places of the trial site were taken to get a survey of the mean individual density of leafhoppers per leaf .

Samples were taken one week after the first NeemAzal-T/S-application ($T_1$ + 7), 8 days after the second application ($T_2$ + 8) and 17 days after the second application ($T_2$ + 17). Sampling places are indicated in Figure 1. Only larval- and nymphal stages were examined, for these are generally the development stages to be controlled.

## Results

### *Assessment of infestation*

The first assessment was conducted on 01.07.97. Looking at Table 2 there was a permanent decrease in mean larval density up to the 21st of July. Compared to the larval decrease, the appearance of adult *Empoasca vitis* increased in a striking way (visual observation). At the end of July the larval density began to increase again due to the hatching and development of the second leafhopper generation. The first NeemAzal-T/S-application was carried out at the beginning of August during a period of a mean density of about 1,37 larvae/leaf, which is still below the recommended threshold of 3 - 5 larvae per leaf. The reason for applying at that time was the relatively heavy leaf-damage on the vines and the already late time of season.

**Table 2:** Mean individual density of leafhoppers per leaf before treatment with NeemAzal-T/S, Deidesheim/Pfalz,1997

| sampling date | mean no. of leafhopper-larvae per leaf (n=150) |
|---|---|
| 01.07.97 | 1,94 |
| 07.07.97 | 1,27 |
| 10.07.97 | 0,74 |
| 14.07.97 | 0,61 |
| 21.07.97 | 0,49 |
| 28.07.97 | 0,65 |
| 31.07.97 | 1,19 |
| 04.08.97 | 1,37 |

## Effect of NeemAzal-T/S on larval/nymphal stages of *Empoasca vitis*

The results are presented in Figure 2. The degree of effectiveness was calculated according to ABBOTT (1925). In all samples the number of larval stages went down over the samplings due to the development of the second generation of adults. One week after the first NeemAzal-T/S-treatment the mean larval density in the control-samples reached about 2,4 individuals per leaf. At the same time the Neem-samples showed a mean abundance of 1,4 leafhoppers/leaf which was approximately 45% below the density of the untreated leaves. 8 days after the second Neem-application the efficacy was quite noticeable and resulted in a larval decrease of about 44% in the Neem-samples. Another 9 days later ($T_2$ + 17) the differences between the average number of larvae per leaf in untreated and treated samples rose up: compared to the untreated control-samples there was a decrease of 62% in the treated samples.

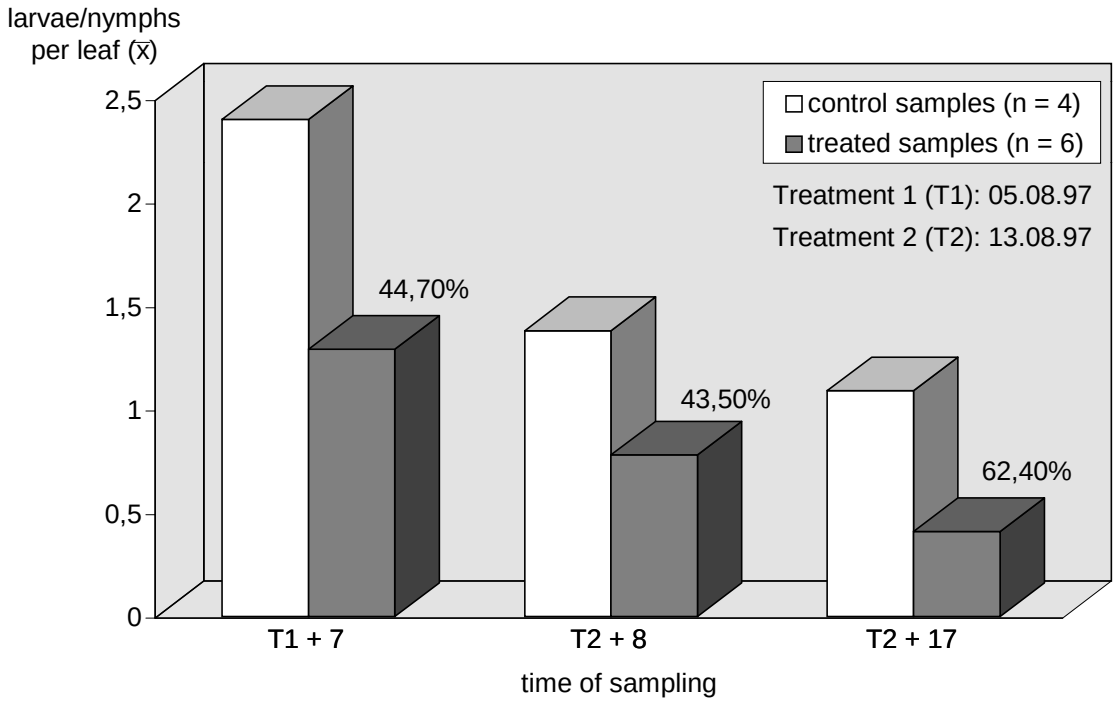


**Figure 2:** Efficacy (%) of NeemAzal-T/S on *Empoasca vitis*, Deidesheim/Pfalz 1997

## Discussion

The first application of NeemAzal-T/S resulted in a leafhopper reduction of about 44%. One week after the second application the efficacy reached 45 %. 17 days after the second treatment the samples showed a decrease of leafhopper larvae of 62% in the samples taken off the treated site.

Looking at the results in general the impact of NeemAzal-T/S on *Empoasca vitis* was not sufficient. One reason for that could be that the larval density at the time of application was too high already for a more effective use of NeemAzal-T/S. In viticulture an application is recommended when the target pest has reached the damage threshold, which provisionally is 3 - 5 larvae per leaf for *Empoasca vitis*. In the trial NeemAzal-T/S was applied when the second larval generation reached a level of about 1,5 on average. This was possibly too high already to conduct a successful treatment. Another aspect is that Neem-Products may have a high impact on the reproduction, the development and feeding behaviour of pest insects (Schmutterer 1995). In the case of *Empoasca vitis* therefore further field experiments are necessary to acquire additional results. Especially an early application of NeemAzal-T/S at the beginning of the larval development of the first *Empoasca vitis*-generation needs to be tested.

## References


Abbott, W.S. (1925): A method of computing the effectiveness of an insecticide. J. Econ. Entomology **18**, 265 - 267

Louis, F. u. K.-J. Schirra (1997): Grüne Rebzikade - ein Problem? Das Deutsche Weinmagazin **14**, 12. Juli 1997, 28 - 30

Remund, U. u. E. Boller (1995): Untersuchungen zur Grünen Rebzikade. Schweiz. Zeitschrift für Obst- und Weinbau, 200 - 203

Schmutterer, H. (1995): The Neem Tree: source of unique natural products for integrated pest management, medicine, industry and other purposes. VCH

Weinheim, New York, Basel, Cambridge, Tokyo 1995, 696 pp.