The experiences of the 3 years of ecological grape growing in the Sopron and Pannonhalma wine region with a strange look onto the useful living creatures

Németh Krisztina
Horticultural Faculty, Kecskemét College

Összefoglalás

A szőlőültetvények intenzíven kezelt kultúrák közé tartoznak, melyekre jellemző a nagymértékű növényvédő szer felhasználás. A felhasznált hatóanyagok különböző módon hatnak a szőlőültetvény ökoszisztémájára, ezen belül a hasznos élő szervezetekre. A környezetkímélő termesztés törekszik arra, hogy csak olyan módszereket, eszközöket és vegyszereket alkalmazzon, melyek minimálisra csökkentik a környezetterhelést és védik a hasznos élő szervezeteket.

A szőlő károsítói közül a termesztéstechnológia hatásosságának, a növényvédelem intenzitásának és a peszticid terhelés kimutatásának legjobb indikátorai a különböző fajokhoz tartozó atkapopulációk előfordulása és mennyiségi aránya az ültetvényen belül. A Soproni és a Pannonhalmi borvidék szőlőültetvényeiben végzett felmérések adatait ismertetem.

Summary

Vineyards belong to intensive cultures where pesticide usage is significantly high. The used pesticides have a different effect on vineyard ecosystem, thus on the beneficial living creatures. The environmentally friendly growing tries to apply methods, means and chemicals that minimize environment pollution and protects beneficial living creatures.

The regular soil and leaf analysis, as well as balanced bud loading resulted in a homogeneous plantation. Plant protection that is based on forecasting and is reasonable and pointed at the particular disease reduced unnecessary protections. Out of the grape pests the best indicators of the intensity of technology and pesticide loading are the occurrence of mite populations and their quantity rate in the vineyards. We are reviewing the results of the plant protection treatments in the Sopron and Pannonhalma Wine District.

Key words: vineyard**,** biodiversity, indicator, zoophag mites

1.Introdution

The living organisms meet with several environmental impacts. The located plants can not avoid the stress, they will have to get used to it or they should perish. In case of a symbioses it means, that some of them survive the harmful impacts, but the other ones will be wasted or selected. Finally the spread of a living organism or species determined by what kind of adverse impact they can tolerate, or they can adapt to in order to remain competitive against other species and strains.

The vineyards are intensively treated cultures, which arecharacterized by high volume of pesticide usage. The used ingredients affect on a different way to the ecosystem of vineyard, including beneficial living organisms. The environmentally friendly growing strives to use those kinds of methods, instruments and chemicals, which minimize the environmental impact and protect the beneficial organisms. In the monocultures of grape and fruit orchards planned for 20-25 years or even longer, extremely favourable conditions have occurred to the

reproduction of pests specialized for given food-plants.From this reason the duties of pest control have increased, and these duties must be resolved while the pesticide-burden won't be increased. From the middle of 70's among the pests of grape orchards recurring pest control problems have been caused by Acarida species. They displayed due to transformation of nutrient replenishment technologies and the adverse side effects of chemical pest control. The vineyards are intensively farmed monocultures, where the large and sometimes incorrectly performed plant-control treatment contributed to the proliferation of phytopha-gous mites, and the nearly complete extermination of predators. By reconsideration of cultivation methods and plant protection, such environmentally friendly technologies can be developed, where the beneficial predator species can be settled, and the restrictive role of natural enemies of the plantations can be determined. The objective of our work was to develop opportunities and technological alternatives in order to reduce the pesticide load on the environment (also the cost of pest control), and allow the colonization and survival of Phytoseiidae species, they have a role in restriction of pest mite species living on vineyards.

2.Literature review

It has started to talk about environmental friendly pest control methods after the spread of chemical defences, the unlimited usage of chemicals, whereas before all the methods were environmental friendly [5](MIKULÁS I, 2001). The majority of researchers state, that in agrobiotops treated with chemical agents, fails the restriction of pest populations due to extinction and decrease to the minima the number of natural enemies and beneficial organism, hereby number of neutral species becomes a pest hard to be defeated [3](JENSER, 1991).

None of the populations are allowed to proliferate en masse in vineyard's ecosystem. Achieving of a reasonable yield can be done with a continous chemical interefence, which may cause undesired side effects. The anti-powdery-mildew agents affect both, the spider mites (Tetranychidae sp.) and also against the predatory mites, incorrect application of these agents can also destroy the predatory mites out of the orchard. In order to avoid this, a friendly and useful pest control needs to be done for beneficial organisms and adequate living conditions, living environment should be provided. The diversity of species has a great importance in agrobiotops, because this biological systems are more stable and consist of many species.

[2]HOFFMANN (1991) observed in organic cultivation the proliferation of useful arachnidaes (Arachnida), predator bugs (Orius sp)), (Ichneumonidaes) and (Coccinellidae), and parazitoides. There was a great role of inline flourishing in addition to use friendly pesticides in this case. [1]HILL (1985) also experienced the positive impact of grassing for the development of number of useful animals, but he did not observe any reduction in the number of chewing pests. [6]PAULY (1994) states, that grassy fallow, containing flowery plants in the phase of pre-deployment can contribute, that useful animals of previous orchard to be maintained on the territory.

3. Materials and methods

The elementary condition to the development of environmentally friendly plant protection technology will be the creation of databases in order to predict the presence of harmful organisms. The products used in pest control, were exclusively environmentally friendly, made of natural raw-materials, and had been freely used. To assess the individual density of mites, occurring on grape leaves, on monthly basis I collected 20-20 leaves randomly from the bottom.

The collected samples were examined under a microscope, then the found specimens were picked off and stored in AGA solution or rather in alcohol, then they were directly mounted. In order to determine race, the mites had been prepared to slide in Berlese-Hoyer tincture, and closed with coverslip. The determination of the mite species was performed according to key of [4]KARG(1993).

dates of sampling		
	4. april 2011	
21. may 2010	16. may 2011	16. may 2012
15. june 2010	9. june 2011	6. june 2012
15. july 2010	20. july 2011	11. july 2012
18. august 2010	19. august 2011	21. august 2012

Treatments

My tests have been made within Austrian-Hungarian co-operation ECOWIN, at Sopron wine province, at the accommodation road of Spernsteiner at the Weninger Winery, at the Fényes Winery and at the SOPVIN „Felsőültetvényes" vineyard, near border of Balf and at the Láng Winery „Kövi szőlők" in Kőszeg and at the Cezar Winery in Nagyrada and at the vineyard of Écs-Babszökő, which belongs to the Abbey of Pannonhalma.

In early years the production technology of orchards at Pannonhalma and Nagyrada and Sopvin and Fényes Winery followed the principles of large-scale production. From 2010 began the transition to organic cultivation. In Nagyrada it started with Cabernet Sauvignon, with Guyot-trellis system, the orchard, planted in 2006, was well-groomed in good condition, with a lack of grapevine of 2%. The area at Pannonhalma displayed similar condition, where the transition began with the varieties as follows: Cabernet Franc, Merlot, Rhine Riesling and Pinot Noir. There are new plantation in vineyard of Sopvin.

The forecast-system has been introduced against pests (tortrix moth, grape berry moth, Lobesia botrana, Eupoecilia ambiguella), and causative agents (downy mildew and powdery-mildew) too. Against the previous areas in the orchards of Weninger Winery the organic cultivation has begun earlier with the vinegrape Blaufränkisch. Only natural materials are being used to protect against fungal diseases: Mycosin vin, Alginure, Oikomb, Vitisan, Prev B2, Cuprum and Sulphur, against mites pesticides won't be used, and against moths dispenser has been applied.

Vineyard in ECOWIN project

1.) Écs Babszökő dűlő of Abbey of Pannonhalma
Sort: Rhenish risling Bernk.68., Merlot, Pinot noir
Trellis system: Guyot 2,4 x 0,8m

2.) Weninger Winery Spern Steiner dűlő near border of Balf
Sort: Blaufränkisch
Trellis system: Guyot 3 x 1,1 m
Cover crop: natural grass, mainly Agropyron repens

3.) Cezar Winery in Nagyrada near Garabonc
Sort: Cabernet sauvignon
Trellis system: Guyot 2,6 x 0,9 m
Cover crop: natural grass, mainly Equisitum arvense, in 2011 cover crop seeding

4.) Fényes Winery near border of Balf
Sort:Cabernet franc
Trellis system: Guyot 2,5 x 0,98 m
Cover crop: natural grass with some grass species

5.) Sopvin Winery „Felsőültetvényes" vineyard
Sort: Blaufränkisch
Trellis system: Lens Moser 2,5 x 0,8 m
New plantation.

6.) Láng Winery in Kőszeg „Kövi szőlők" vineyard
Sort: Blaufränkisch
Trellis system: Umbrella 3,2 x 1,2m
Cover crop: very diversity vegetable with Equisitum arvense

4. Results

Treatments in 2010

The figures of the first examination year clearly identify the plantations where predatory mites were present but the Weninger Spernsteiner vineyard is the only one where the amount of predatory mites reached the target level, i.e. at least one predatory mite per leaf. This was basically foreseeable due to the organic farming conducted in the Weninger Spernsteiner vineyard over the past few years, hence the previously used pesticides did not affect adversely the reproduction of zoophagous mites. Furthermore, cover crops also beneficially contributed to the persistence of the mites. High *Tydeidea sp.* population numbers can be observed in this plantation, too. *Tydeidea sp.* mites are neutral for the vine plants and the role they play has not been ascertained yet but certain sources suggest that they can

contribute to the efficient protection against powdery mildew as these mites can feed on mildew hyphen.

Compared to May, the number of mites collected in June decreased, which is regarded as normal, primarily due to the intensive shoot growth because the reproduction rate of the predatory mites cannot keep pace with the foliage growth rate.

The data collected in the first year serve solely as a point of reference as the area had been subject to no mite monitoring in the previous years. The presence of other predatory organisms in each plantation is, however, a promising phenomenon: I found pupas of hoverflies (*Syrphidae*) on the field horsetails (*Equisitum arvense*) and 12-spot ladybirds (*Thea vigintiduopunctata*) in the Kőszeg Kövi vineyard. In the Pannonhalma Écs Babszökő vineyard, I detected the presence of the larvae of harlequin ladybirds (*Harmonia axyridis*), stag beetles *(Lucanus cervus*) as well as the presence of *Cassida sp*'s could be traced on weeds; the significance of this latter finding lies in the role that *Cassida sp.* can play as a biological weed control agent in the protection against weeds.

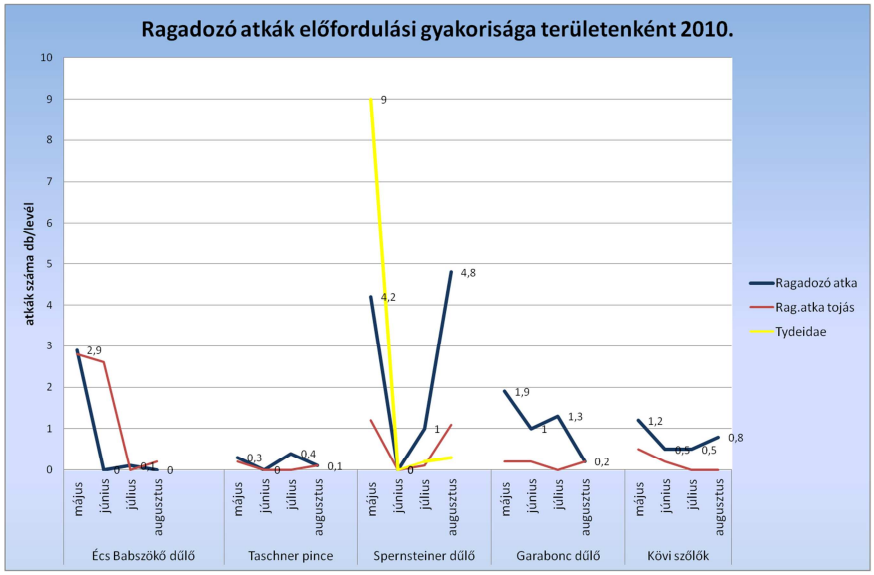

Figure 1: Zoophagous mites of vineyards in 2010.

Treatments in 2011

With the exception of the Babszökő vineyard, all plantations were observed in 2011 with the presence of a varying amount of zoophagous mites; but in fact their quantity was usually low. Thanks to its *T. pyri* and *Tydeidae sp.* population, the Spernsteiner vineyard was an exception this year again. The 0.6 *T. pyri* per leaf ratio in May has increased to 1.6 predatory mites per leaf by August, which is a considerable increase. The threshold of the predator vs. pest natural control balance is 1 predator per leaf, thus the zoophagous mites can help keep the number of phytophagous mites below the damage threshold.

The *Convolvulus arvensis* population, i.e. the primary food source of *Tetranychus urticae*, drastically increased in the newly planted Felsőültetvényes vineyard, which is an

adverse tendency, while in the Garabonc vineyard, the increasing number of the common ragweed (*Ambrosia artemisifolia*) population caused problems.

On the other hand, the presence of zoophagous mite eggs was a positive sign in the Babszökő vineyard in Écs, as it indicates that crop protection methods did not eliminate the zoophagous mites; in fact, they are still present in the plantation but the increase of their numbers will take time. Results are quite similar in the new Sopvin Kft plantation, too.

The results yielded in the winterer population demonstrate the significance of *T. pyri* among the predatory mite species. The number of *T. pyri* is low yet; however, this is natural in the case of in-conversion plantations as the population increase requires at least 3 years.

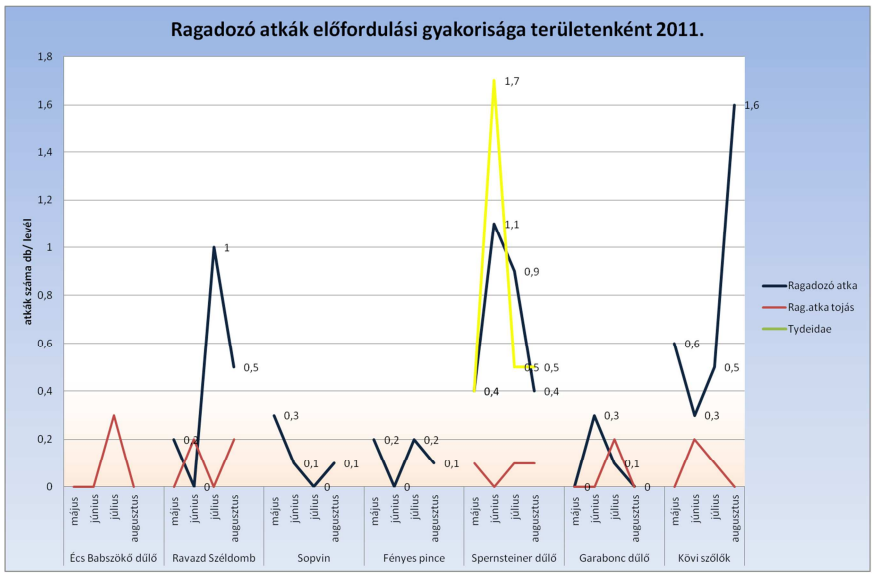

Figure 2: Zoophagous mites of vineyards in 2011.

Treatments in 2012

The results that the examinations yielded in 2012 were similar to those in the previous years. Cover crops were planted in the plantations in the autumn of 2010 and the spring of 2011; however, the predatory mite populations did not reach high numbers yet. The presence of zoophagous organisms in the Babszökő vineyard (Écs) of Abbey Winery Pannonhalma could be detected; however, the number of mites did not increase significantly in this vineyard yet. Probably ecological factors played a significant role in this population growth failure as otherwise both the usage of pesticides and agrotechnical as well as phytotechnological methods complied with the requirements from agronomic point of view. The vineyard used organic spray substances recommended by Biocont (e.g. Alginure, Prev B2, Oikomb) along with plant conditioners.

Organic farming had been conducted in the Weninger Spernsteiner plantation even prior to 2010, which allowed the zoophagous mites to reach high numbers in each of the three examination years. The 2.6 zoophagous mites per leaf ratio well exceeds the expectations and their controlling role is prevalent. However, the number of species and families is well below the numbers in the Kőszeg Kövi vineyards. The biotopes in the surroundings of the plantations in Kőszeg enhance opportunities for important beneficial organisms. The zoophagous mites started to reproduce and their numbers have been increasing in the new

plantings of the Felsőültetvényes vineyard of Sopvin Kft despite the absence of predator mite ecesis. This is promising because it demonstrates that man-induced mite ecesis is not necessary as native species reproduce in the given region if cultivation practices are properly followed.

The wine-growing areas of Fényes Winery and the Garabonc vineyard of Cezar Winery show similarities to conventional farming from the point of view of the number and population of mite species. The examined sample parcel of Garabonc vineyard is surrounded by conventionally cultivated areas, hence pesticide drift was a risk factor due to the insufficient isolation distances. The Fényes Winery joined the project later on, therefore it could not meet the minimum requirement of the 3-year conversion period yet.

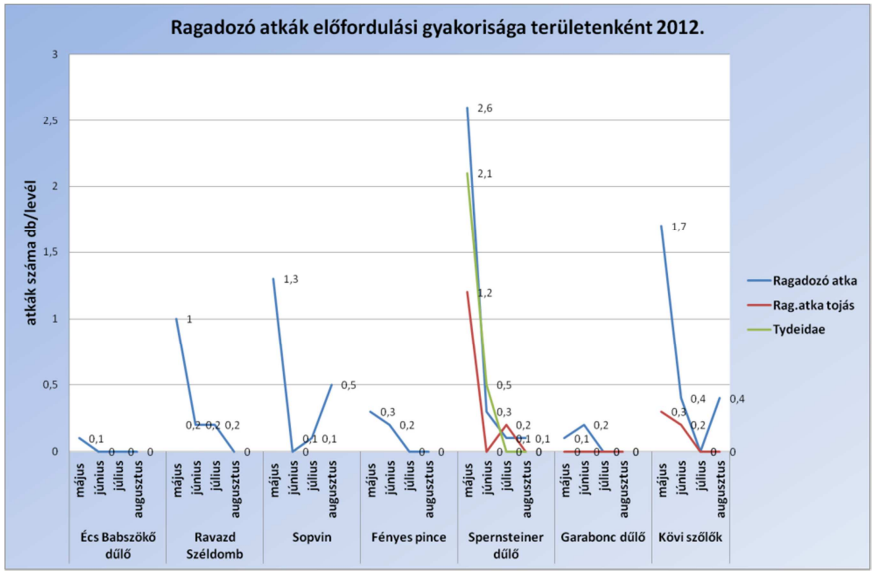

Figure 3: Zoophagous mites of vineyards in 2012

Écs	Sopvin F/36	Tascner pince	Fényes pince	Spersteiner dűlő	Garabonc dűlő	Kövi szőlők
T. pyri	T.pyri	T.pyri	T. pyri	T. pyri	T. pyri	T. pyri
E.finlandicus				E.finlandicus		E.finlandicus
		Tydeidae	Tydeidae	Tydeidae		A.andersoni
C. vitis	C.vitis				C. vitis	C. vitis
E. vitis	E. vitis	E. vitis	E. vitis	E. vitis	E. vitis	E. vitis
			Acaridae	Acaridae		Acaridae
			Tarsonemidae	Tarsonemidae		
				Anystidae		

Table 1: Phytophagous and zoophagous mites in vineyards beetwen 2010 and 2012

Conclusion

- It was not mite damage during the study years
- There are phytophagous mites in each vineyards only detection degree
- There are predatory mites in each vineyards
- Individual number of the collected species of mites was very different in each vineyards
- The quantity *Phytoseiidae* sp. depend on the method of technology and on the weather
- Between 2010 and 2012 were identified 5 mite species and 6 mite families.
- The dominancy of the predatory mite species *Typhlodromus pyri* and *Euseius finlandicus*, and of the phytophagous mite species *Eriophyes vitis* and *Calepitrimerus vitis* in the vineyards was proved.
- The dominancy of the unconcerned mite species *Tydeidae* and *Acaridae* in the vineyards was proved.
- The populations of mite species in grape plantations can indicate the intensity of cultivation technology and overuse of pesticides.

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Dr. Krisztina Németh: Horticultural Faculty, Kecskemét College
Address: H-Kecskemét Erdei F. tér 1-3. E-mail: nemeth.krisztina@kfk.kefo.hu