

RESEARCH ARTICLE



Predatory mites in Merlot grape cultivar in two different vineyards

ARIS HUQI*, NATASHA DURAJ (HAKA)¹¹PhD student in in Agricultural University of Tirana, Kodër Kamëz, Tirana Albania¹Full Professor in Agricultural University of Tirana, Kodër Kamëz, Tirana Albania

*Corresponding author; E-mail: agro.huqi13@gmail.com

Abstract

The aim of this study was to collect data about predatory mites species that are present in two different vineyards with the same cultivar (Merlot), that are located in different places, in Hamallaj and Shkafane, Durres, Albania, during 2015-2016. The two year results showed that in both vineyards we have found four predatory mite species of Phytoseiidae family: *Amblyseius andersoni*, *Amblyseius stipulatus*, *Phytoseius finitimus* and *Typhlodromus pyri*. During 2015 in both vineyards, we have found two predatory species: *Amblyseius stipulatus* only in vineyard II in Shkafane and *Phytoseius finitimus* in both vineyards. In vineyard I in Hamallaj we have found higher number of predatory mites per leave per period (2.8 *Phytoseius finitimus*). During 2016 in both vineyards, we have found four predatory species: *Amblyseius andersoni*, *Amblyseius stipulatus*, *Phytoseius finitimus* and *Typhlodromus pyri*. In vineyard II we have found fourth specie. In vineyard I we have found three species: *Phytoseius finitimus*, *Amblyseius andersoni* and *Amblyseius stipulatus*. From the two-year study in Hamallaj, September 2016 was the most populated period with phytoseiids mites (6.6 mites per leaf). In total from both vineyards, *Phytoseius finitimus* was found in higher number than other species (50% of the population). There is no difference between years and vineyards. Mites of the Tetranychidae families were also present in these vineyards. In both vineyards were found diverse generalist predatory species and in satisfactory number for biological control, especially in vineyard I, farmers do not need to use PPP for controlling phytophag mites if it appears.

Keywords: Predatory mites, vineyard, *Phytoseius finitimus*, *Amblyseius stipulatus*, Merlot, species.

1. Introduction

The family *Phytoseiidae* includes many species of predators involved in the control of mite pests of crops all over the world. Predatory mites of *Phytoseiidae* family are able to keep under the damage levels the populations of Eriophyids and Tetranychid mites. These mites coexist with other Families like Tydeidae mites, etc [5]. In European vineyards, these natural enemies play a key role in plant protection as their presence usually makes the use of acaricides unnecessary [19]. Many studies have focussed on the family *Phytoseiidae* because of their role as biological control agents of phytophagous mites (particularly of the Tetranychoida and Eriophyoidea) and small insects such as thrips, coccids and whiteflies [9, 12, 18].

Phytoseiid mites have a considerable economic impact because they are predators of several phytophagous mites, including spider mites (Tetranychidae) [20] Some studies have shown its ability to control phytophagous mites, whiteflies and thrips and to develop when fed with pollen [1, 16]. Most species are generalist predators, able to survive and develop feeding on prey (mites and/or insects) when they are present, but also capable of surviving on a great variety of foods (pollen, plant exudates, fungi, etc). Despite being known mainly as predators of small arthropods and nematodes, most phytoseiids also have other feeding habits, consuming food items such as fungi, plant exudates, pollen, etc. Some are even able to extract liquid from leaf cells. Biological control of grape mite pests using *Phytoseiidae* has been of interest for more than 30 years [6, 8, 11, 12]. This family includes more than 90 genera and 2479 species [4, 14].

Mc murty at al (2013) has classified *Ph.finitimus*, *T.pyri* in type III life style like generalist predators and in Subtype III-a—Generalist predators living on pubescent leaves. Whereas *A.andersoni* and *A.stipulatus* in type IV of life style (Generalist) like pollen feeding generalist predator, [3, 13] *Amblyseius andersoni* was observed to be abundant and more effective as a predator of spider mites on grape varieties with more glabrous leaves [2, 7]. The main objective of this study was: to identify predatory mite species that are present in these vineyards, to define which was the dominant species, who was the most populated period with predatory mites, in which vineyard, year or sampling period we find the highest number of predatory mite species of Phytoseiidae family.

2. Material and Methods

This study was conducted during 2015-2016 in Merlot grape cultivar in two vineyards. Vineyard I is located: in Hamallaj Albania (41°28'20.4"N 19°32'44.9"E) set on a field area in a surface 0.1 ha, age of grapes was 8 years. Vineyard II is located: in Shkafane Albania (41°29'04.1"N 19°34'37.7"E) set on a hill area in a surface 0.1 ha. For both vineyards form of cultivation was with row. In these vineyards were carried out all the necessary agro-technical services. During the two seasons of vegetation the farmers to protect vineyards from pests and diseases have used conventional treatment schemes with chemical fungicide and insecticide. Meteorological data were obtained from Weather Station, figure 1.

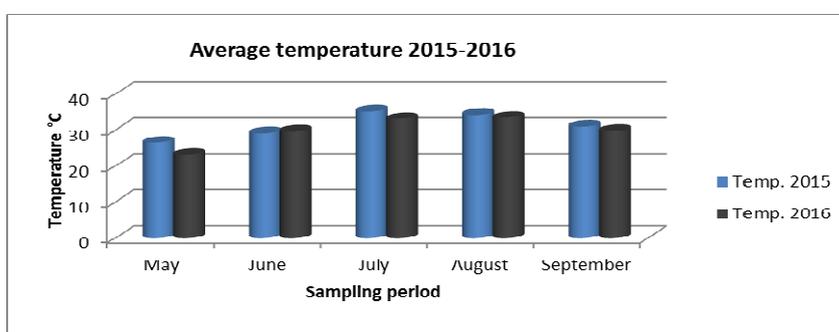


Figure 1. Monthly average temperature for two years study.

For this study we have taken leaves during the vegetative period for five months in two years 2015-2016. Sampling was done once a month in five periods. For each cultivar we took 15 leaves [10], leaves were taken inside of the rows and in the middle of sprig (Duraj 2000), (to avoid the first row and the first three plants in the second row), and were brought to the laboratory in plastic bags. Mites on the leaves were counted under the stereomicroscope and mounted in Hoyer's. To determine the species of phytoseiid mites we have worked with many identification keys for Phytoseiidae family [15, 19]. Nomenclatures of the crests were based on the systems of Lindquist and Evans and adopted for the Phytoseiidae family from [17].

3. Results and Discussion

During this study 2015-2016, in both vineyards with Merlot grape we have found four predatory mite specie of Phytoseiidae family:

- *Amblyseius andersoni* (Chant 1957)
- *Amblyseius stipulatus* (Athias-Henriot 1960) or *Euseius stipulates* (Athias-Henriot 1960)
- *Phytoseius finitimus* (Ribaga 1904)
- *Typhlodromus pyri* (Scheuten, 1857) or *Typhlodromus (Typhlodromus) pyri* (Scheuten, 1857)

3.1. The first year results.

During the first year of the study (2015) in both vineyards, we have found two predatory specie of Phytoseiidae family: *Amblyseius stipulatus* and *Phytoseius finitimus*. In vineyard I in Hamallaj during the first year of the study, we have found only *Phytoseius finitimus*. The most populated period with predatory mites of Phytoseiidae family was the period of May (3.67 ± 0.45 mites/leaf). In this vineyard we have found tetranychid mites only in the period of September (3 ± 0.29 mites/leaf). On average for the sampling period, during 2015 in this vineyard we have found 2.8 phytoseiids (*Ph.finitimus*) per leaf per period. In vineyard II in Shkafane, we

have found both species, *Amblyseius stipulatus* and *Phytoseius finitimus*. The most populated period with predatory mites of Phytoseiidae family was the period of August (3.13 ± 0.29 mites/leaf). In the period of September we have found at the same time both species. The most populated period with *Phytoseius finitimus* predatory mites was the period of June with 1.93 ± 0.45 mites/leaf. Whereas the most populated period with *Amblyseius stipulatus* was the period of August 3.13 ± 0.36 mites/leaf. In this vineyard we have found tetranychid mites only in the period of September (0.33 ± 0.29 mites/leaf), figure 2 and figure 3.

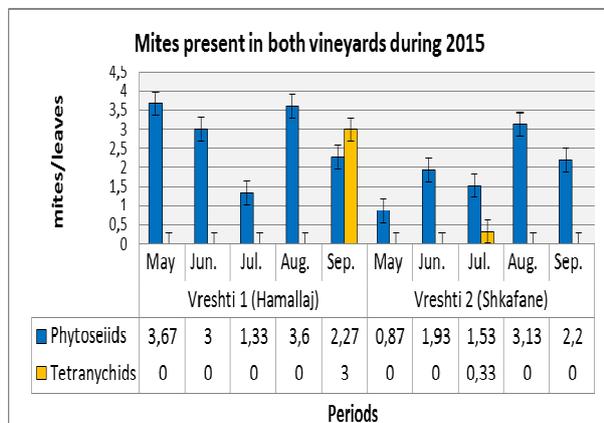


Figure 2. Graph with first year results, phytoseiids and tetranychids mites present during 2015 in both vineyards.

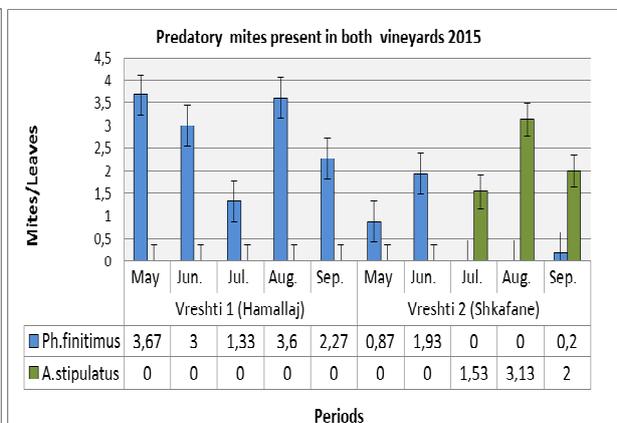


Figure 3. Predatory mites of the Phytoseiidae family (*A. stipulatus*, *Ph. finitimus*) present during 2015 in both vineyards.

During this year in this vineyard *Amblyseius stipulatus* was found in higher number than *Phytoseius finitimus*. On average for the sampling period, during 2015 we have found 1.3 *Amblyseius stipulatus* per leaf per period) and 0.6 *Phytoseius finitimus*. per leaf per period. From both vineyards predatory mites of Phytoseiidae family were found in higher number than phytophagous mites of Tetranychidae family.

3.2. The second year results.

From the second year of the study (2016) we have found four predatory species of Phytoseiidae family: *Amblyseius andersoni*, *Amblyseius stipulatus* and *Phytoseius finitimus*, *Typhlodromus pyri*. In vineyard I in Hamallaj during 2016 we have found three species of Phytoseiidae family: *Phytoseius finitimus*, *Amblyseius andersoni* and *Amblyseius stipulatus*. *Phytoseius finitimus* and *Amblyseius stipulatus*, were found in higher number than *Amblyseius andersoni*. *Phytoseius finitimus* was found from May to July, the most populated period with *Ph. finitimus* was the period of July, in this period we have found 3.67 ± 0.36 mites/leaf.

We have found *Amblyseius stipulatus* and *Amblyseius andersoni* in period of August and September. The most populated period with *Amblyseius stipulatus* was the period of September. In this period we have found 4.93 ± 0.53 mites/leaves. The most populated period with *Amblyseius andersoni* was the period of August. In this period we have found 2.73 ± 0.29 mites/leaves. Tetranychids were found only in September, figure 4 and figure 5. In vineyard II in Shkafane during 2016, we have found four specie of Phytoseiidae family: *Amblyseius stipulatus* was found in higher number than other specie.

We have found this species in the period of August and September. The most populated period with *A.stipulatus* was the period of September (3 ± 0.53 mites per leaves). *Typhlodromus pyri* was the second. This specie was present in July and September. We have found *T. pyri* in higher number in the period of July (1.53 ± 0.15 per leaves). *Amblyseius andersoni* was found in August and in September, whereas *Ph. finitimus* was found only in the period of June. In May we have not found predatory mites, figure 4 and figure 5.

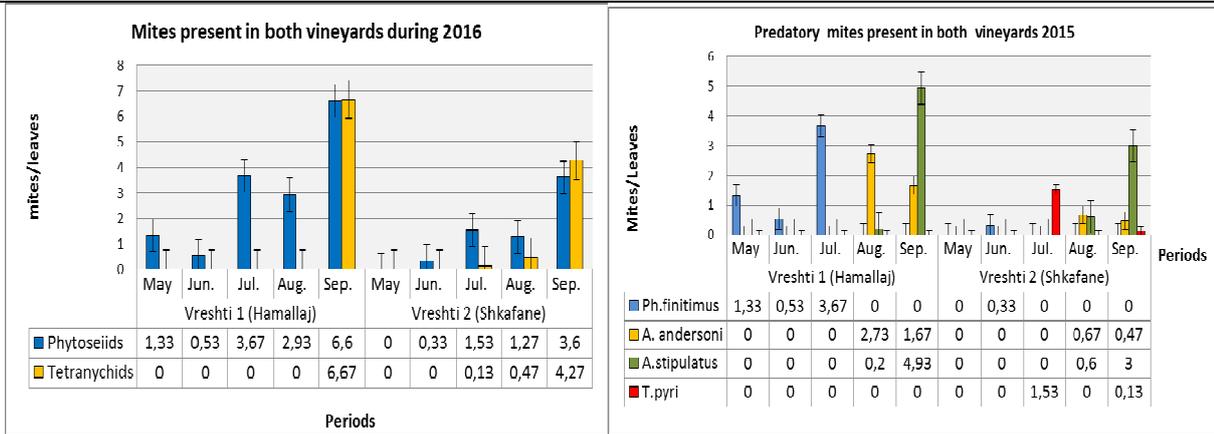


Figure 4. Graph with first year results, phytoseiids and tetranychids mites present during 2016 in both vineyards.

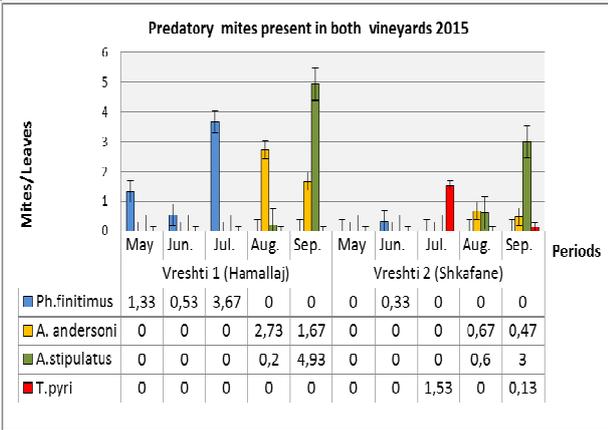


Figure 5. Predatory mites of the Phytoseidae family (*A. andersoni*, *A. stipulatus*, *Ph. finitimus*, *T. pyri*) present during 2016 in both vineyards.

On average for the sampling period, during 2016 *Amblyseius stipulatus* was found in higher number than other specie (1.1 phytoseiids per leaf per period). From the two-year study in Hamallaj, the period of September 2016 was the most populated period with phytoseiids mite (6.6 mites per leaf). In vineyard 2 in Shkafane in the period of September we have found in same time three specie, *A. andersoni*, *A. stipulatus*, *T. pyri*. The most populated period with tetranychid mites was the period of September 2016 in vineyard I, (6.67 mites per leaf) also in this period we have found the highest number of predatory mites (6.6 mites/leaves) from two specie. (*A. andersoni* and *A. stipulatus*).

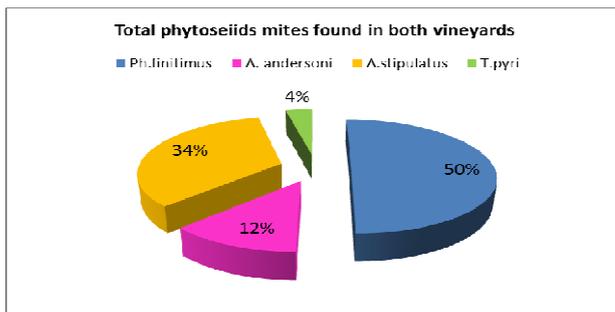


Figure 6. Total population of predatory mites.

In total from both vineyards, *Phytoseius finitimus* was found in higher number than other specie. This predator occupies about 50% of the specie population found in both vineyards during 2015-2016. *A. stipulatus* was the second species with 34%, *A. andersoni* occupies about 12% and *T. pyri* occupies about 4%, figure 6. There is no statistically verified difference between years and vineyards.

4. Conclusions

During this study in both vineyards from two-years 2015-2016 we have found four predatory mite species of Phytoseidae family:

- *Amblyseius andersoni* (Chant 1957),
- *Amblyseius stipulatus* (Athias-Henriot 1960)
- *Phytoseius finitimus* (Ribaga 1904)
- *Typhlodromus pyri* (Scheuten, 1857)

In total from both vineyards *Phytoseius finitimus* (Ribaga 1904) was the dominant predatory species with 50% of total from 4 specie. In September 2016 in vineyard I we have found a higher number of predatory mites per leaf (*Amblyseius stipulatus*). The most populated period with predatory mites of Phytoseiidae was the period of September 2016. In this period in vineyard I in Hamallaj we have found a higher number of predatory mites. Between years we have not a significant difference. From both vineyards in September 2016 we have found a higher number of phytophag mites of Tetranychidae family. There is no statistically verified difference between years and vineyards.

In both vineyards were found diverse generalist predator species and in satisfactory number for biological control, especially in vineyard I in Hamallaj, farmers do not need to use PPP for controlling phytophag mites if it appears.

5. References

1. Ahmad S, Pozzebon A, Duso C: **Predation on heterospecific larvae by adult females of *Kampimodromus aberrans*, *Amblyseius andersoni*, *Typhlodromus pyri* and *Phytoseius finitimus* (Acari: Phytoseiidae)**. Experimental and Applied Acarology 2015, **67**(1): 1-20.
2. Camporese P & Duso C: **Life history and life table parameters of the predatory mite *Typhlodromus talpii***. Entomologia Experimentalis et Applicata 1995, **77**:149–157.
3. Carrillo D, Moraes GJ, Pena JE: **Prospects for Biological Control of Plant Feeding Mites and Other Harmful organisms**. Springer; 2015
4. Demite PR, McMurtry JA & de Moraes GJ: **Phytoseiidae Database: a website for taxonomic and distributional information on phytoseiid mites (Acari)**. Zootaxa, 2014, **3795**(5):571–577.
5. Duraj N, “Distribution of useful mites in different stems of vineyard.” “Shpërndarja e këpushave të dobishme në pjesë të ndryshme të lastarit të hardhisë”. Buletini i Shkencave Bujqësore, 2000, **3**:73-77.
6. Duso C, Fontana P, D'Ascenzio D & Di Silvestro D: **Indagini preliminari sulla diffusione degli Acari Fitoseidi (Acari Phytoseiidae) nei vigneti abruzzesi I**. Atti Giornate Fitopatologiche, 1994, **2**: 219–226.
7. Duso C, Pasini M & Pellegrini M: **Distribution of the predatory mite *Typhlodromus pyri* (Acari: Phytoseiidae) on different apple cultivars**. Biocontrol Science & Technology 2003, **13**: 671–681.
8. Duso C, Pozzebon A, Kreiter S, Tixier MS & Candolfi MP: **Management of phytophagous mites in European vineyards**. In: Bostanian, N.J., Vincent, C. & Isaacs, R. (Eds.), **Arthropod Management in Vineyards: Pests, Approaches, and Future Directions**, Springer; 2012: 19–217.
9. Gerson U, Smiley RL & Ochoa R: **Mites (Acari) for Pest Control**. Blackwell Publishing; 2003
10. Girolami V, Refatti E, Duso C and Osler R: **Lotta Integrata in viticoltura. Malattia delle vite**, 1989, IRIPA COLDIRETTI; 1989.
11. McMurtry JA, Huffaker CB & Van de Vrie M: **Ecology of tetranychid mites and their natural enemies: A review. I. Tetranychid enemies: Their biological characters and the impact of spray practices**. Hilgardia 1970, **40** (33), 1–390.
12. McMurtry JA & Croft BA: **Life-styles of phytoseiid mites and their roles in biological control**. Annual Review of Entomology 1997, **42**; 291–321.
13. Mcmurtry JA, De Moraes GJ & Sourassou N F: **Revision of the lifestyles of phytoseiid mites (Acari: Phytoseiidae) and implications for biological control strategies**. Systematic & Applied Acarology 2013, **18**(4): 297–320
14. Moraes GJ de, McMurtry JA, Denmark HA & Campos CB: **A revised catalog of the mite family Phytoseiidae**. Zootaxa 2004, **434**(1) :494.
15. Papadoulis GTh & Emmanouel NG. **The genus *Amblyseius* (Acari: Phytoseiidae) in Greece, with the Description of a New Species**. Entomologia Hellenica 1991, **9**:35-62
16. Pappas ML, Xanthis C, Samaras K, Koveos DS, Broufas GD: **Potential of the predatory mite *Phytoseius finitimus* (Acari: Phytoseiidae) to feed and reproduce on greenhouse pests**. Experimental and Applied Acarology, 2013, **61** (4): 387-401.

17. Rowell HJ, Chant DA & Hansell RIC: **The determination of setal homologies and setal patterns on the dorsal shield in the family Phytoseiidae (Acarina: Mesostigmata).** The Canadian Entomologist 1978, 110 (8): 859–876.
18. Serrano E, Vigues V & Merendet V: **Etude de la prédation du thrips Drepanothrips reuteri par Typhlodromus pyri.** Proceedings of the Colloque Mondiacviti, Bordeaux, 1 & 2 December, 2004; 1–11.
19. Tixier MS, Baldassar A, Duso C, Kreiter S: **Phytoseiidae in European grape (Vitisvinifera L): bioecological aspects & keys to species (Acari: Mesostigmata).** Zootaxa 2013, 3721(2): 101–142.
20. Yesglayer A, Çobanoğlu S: **The distribution of predatory mite species (Acari: Phytoseiidae) on ornamental plants and parks of Istanbul, Turkey.** Türk. entomol. bült. 2011, 1 (3):135-143, Res. 2009, 105: 177–183.