Journal of Multidisciplinary Engineering Science and Technology (JMEST)
ISSN: 2458-9403
Vol. 4 Issue 10, October - 2017

Phytoseid mites present in Sheshi bardhë grape cultivar in different vineyards

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***Abstract*— The study was conducted in 2015-2016, in one grape vine cultivar (Sheshi bardhë) in four vineyards that are located in different places. Leave sampling were done once a month for five months (May to September) in two years. The aim of this study was to identify phytoseiid mites species that are present in Sheshi bardhë grape cultivar in different vineyards and defining which was the dominant species. During the first year of the study resulted that the most populated period with predatory mites was May and in the second year of the study the most populated period was August. The result of the study showed that in these vineyards were present three species of Phytoseidae family: *Amblyseius stipulatus, Phytoseius finitimus, and Typhlodromus pyri*. In Vineyard I in the period of August 2016 we have found the highest number of phytoseiids mite species (*Amblyseius stipulatus, Phytoseius finitimus*, and Typhlodromus pyri). *Phytoseius finitimus* was found in higher numbers than other species, also this species was a dominant in all vineyards during the periods of study. *Typhlodromus pyri* was found only in Vineyard I in the period of August 2016. Amblyseius stipulatus were found in Vineyard II in August 2015 and in Vineyard I in August 2016. Mites of the Tydeidae and Tetranychidae families were also present in this grape cultivar in less numbers.**

Keywords—Phytoseiids; mites; Sheshi bardhe; Phytoseius finitimus; vineyard;

I. INTRODUCTION

The family Phytoseiidae is one of the most important mite groups from economical point of view, because several species are well known as natural enemies of mite and insect pests [15]. This family includes more than 90 genera and 2479 species [2, 9]. These biological agents are efficient predators in controlling phytophagous mites and small insects in various crops worldwide [8]. In nature phytophagous mites populations are kept under the economic damage levels by a considerable number of natural enemies such as predatory mites and insects [**4**]. Phytoseiid mites have a considerable economic impact because they are predators of several phytophagous mites, including spider mites (Tetranychidae) [**16**]. Predatory mites of Phytoseiidae family are able to keep under the damage levels the populations of Eriophyds and Tetranychid mites. These mites coexist with other Families like Tydeidae mites, etc [**3**].

The presence of phytoseiid mites on the grapevine shows a better management of pest and diseases of the grape vine. Some species of phytoseiid mites are able to survive, and to remain in high levels even though phytophagous mites are few in number because of their ability to feed on other food sources as pollen, insect's melate and fungus [**5**].

The family Phytoseiidae includes many species of predators involved in the control of mite pests of crops all over the world. In European vineyards, these natural enemies play a key role in plant protection as their presence usually makes the use of acaricides unnecessary [**14**]. Unfavorable climate conditions and the application of broad spectrum pesticides lead to the decrease of predatory mite because they are generally more susceptible to pesticides than their prey [**1**], causing population outbreaks of tetranychid mites specie [**6**, **7**]. Most contact insecticides from different chemical classes are broad spectrum and so affect both prey and predator. [**13**]

With this study we wanted to get acquainted with the species that were present in all these vineyards, which was the species that dominates, who was the most populated period, who were the most populated vineyards with phytoseiid mites and the difference of population of phytoseiid mites between tydeid and tetranychid mites.

II. Material and Methods

This study was conducted during 2015-2016 in one grape Albanian autochthon cultivar (Sheshi bardhë) in four vineyards. Vineyard I is located: in Maminas Albania (41°22'51.2"N 19°36'07.1"E) set on a hill area in a surface 0.15 ha, form of cultivation was tent and the age of grapes was 12 years. Vineyard II is located: in Rade Albania (41°24'24.0"N 19°36'18.6"E) set on a hill area in a surface 0.3 ha, form of cultivation was with row and the age of grapes was 25-40 years. Vineyard III is located in Kamerras Albania Vineyard III (41°25'13.8"N 19° 36' 31.6"E), set on a hill area in a surface 0.25 ha, form of cultivation was with row and the age of grapes was 25-40 years. Vineyard IV is also located in Kamerras Albania (41°25'13.7"N 19° 36' 35.7"E), set on a hill area in a surface 0.3 ha, form of cultivation was with row and the age of grapes was 25-40 years.

In these vineyards were carried out all the necessary agro-technical services. During the two seasons of vegetation, for the disease and pest management (downy mildew, powdery mildew, bunch rot, grapevine moth), the farmer has used pesticides with these active substance: metiram, copper hydroxide, metalaxyl, mancozeb, dimetomorph, penconazole, boscalid+ pyraclostrobin, metrafenone, krexosim-methyl ,alphacypermethrin and chlorpyrifos-ethyl. Meteorological data were obtained from Weather Underground, Table. I. We have use analysis of variance (ANOVA) to determine the difference of population phytoseiid mites between two years of the study, the difference between vineyards and between species, etc.

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, leaves were taken inside of the rows and in the middle of sprig [**3**], (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 [11,14]. Nomenclatures of the crests were based on the systems of Lindquist and Evans and adopted for the Phytoseiidae family from Rowell H. J., Chant D.A. & Hansell R.I.C. [12].

TABLE I. *Average 10days temperature*

Date	Temp.	Date	Temp.
11.05.15	27.1°C	30.07.15	36.3°C
21.05.15	28.4°C	09.08.15	36.6°C
31.05.15	23.9°C	19.08.15	33.8°C
10.06.15	30.3°C	29.08.15	32.5°C
20.06.15	29.7°C	08.09.15	33.8°C
30.06.15	27.4°C	18.09.15	30.4°C
10.07.15	33.8°C	28.09.15	28.6°C
20.07.15	35.4°C		

III. Results and Discussion

This study was conducted during 2015-2016 in one grape Albanian autochthon cultivar (Sheshi bardhë).

During the study that was carried out in four vineyards we have found mites of Phytoseiidae, Tydeidae and Tetranychidae families.

Phytoseiid mites were found in bigger numbers compared to tydeid and tetranychid mites,"Fig. 1".

We have identified three species of phytoseiid mites:

Amblyseius stipulatus (Athias–Henriot),

Phytoseius finitimus (Ribaga),

Typhlodromus pyri (Scheuten)

In the first year (2015) of the study in all vineyards we have found phytoseiid, tydeid, and tetranychid mites.

Phytoseiid mites are found in higher population than tetranychid and tydeid mites. We have found significant difference between (P=0.0001) phytoseiids and tetranychids, we have found also a significant difference (P=0.001) between phytoseiids and tydeids. Tydeids were found in a higher number than tetranychids with a significant difference (P=0.01). "Figure1"

From the first year of the study the growth of Phytoseiidae populations does not depend with population of tetranychid mites, statistically presented where (R^2=0.000001), with regression equation (y= 0.0161x + 1.8142).

Statistically, there is no significant influence of the temperature, in population of phytoseiid mites for: Vineyard I (y= -0.0607x + 3.1147), (R^2 = 0.0423), Vineyard II, (y= -0.4186x + 15.48), R^2 = 0.2272), in both these cultivars we have a very weak negative impact to the phytoseiids. For vineyards IV we have a weak negative impact to the phytoseiids (y= -0,2123x + 8.0425), (R^2= 0.6821). For vineyards III high temperature has a negative impact in population of phytoseiid mites statistically (y= -0,2534x + 10,108), (R^2= 0.9314)

During 2015 Tydeidae population is almost at one level. We have found in high number in Vineyard I in the period of May (1.7±0.1 mites/leaf). In Vineyard III we have not found tydeid mites. We have found tetranychid mites only in Vineyards I and II, in September we have found in Vineyard I the highest number of tetranychidae (0.5±0.03 mites/ leaf).

During the first year of the study we have found two species of phytoseiid mites in all vineyards, these species are *Amblyseius stipulatus* and *Phytoseius finitimus,* we have a significant difference (P=0.00004) between these two species. *Amblyseius stipulatus* was found only in Vineyard II in period of August 0.2±0.01 mites/leaf, "Figure 2".

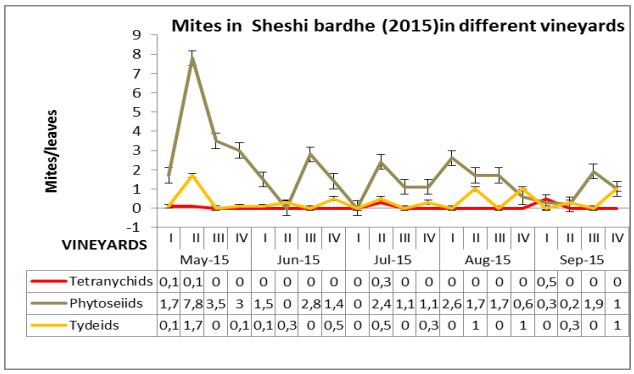

Fig.1. *Mites present in all vineyards during 2015.*

Phytoseius finitimus were present in all vineyards. The most populated Vineyards with *Phytoseius finitimus* were Vineyard II and Vineyard III. The least populated was Vineyard I. May was the most populated period with *Phytoseius finitimus* and September was the least populated period. In Vineyard II in the period of May we have found higher numbers of *Ph. finitimus* per leaves (7.8±0.2).We have no found *Ph. finitimius* in Vineyard II (June 2015) and in Vineyard I (July 2015).

According to the Vineyards:

In Vineyard I August was the most populated period (2.6±0.2mites/leaf) and in July we have not found *Ph. finitimus.* In Vineyard II May was the most populated period (7.8±0.2 mites/leaf) and in June we have not found mites. The most populated period with *Ph. finitimus* in Vineyard III was the period of May (3.5±0.2 mites/leaf) and the least populated period was July (1.1±0.2 mites/leaf. In Vineyard IV May was the most populated period (3±0.2mites/leaf) and in August we have less populations of *Ph. finitimus* (0.6 ±0.2 mites/ leaf), "Figure 2".

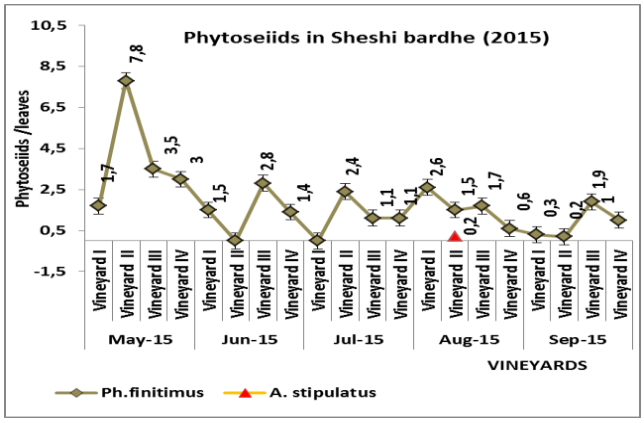

Fig.2. *Phytoseiid mites A. stipulatus and Ph. finitimus present in all vineyards during 2015.*

During the second year (2016) of the study in all vineyards we have found Phytoseiid, Tydeid, and Tetranychid mites.

Even in the second year of the study, phytoseiid mites are found in higher population than tetranychid and tydeid mites. We have found a significant difference between (P=0.001) phytoseiids and tetranychids, we have found also a significant difference (P=0.03) between phytoseiids and tydeids. We have found tydeids in higher number than tetranychids with a significant difference (P= 0.01). "Figure3"

From the second year of the study the growth of Phytoseiidae populations does not depend the population of Tetranychid mites, statistically presented where (R^2=0.0452), significance, with regression equation y = -1.6741x + 3.4919.

Statistically, there is no significant influence of temperature, in population of Phytoseiid mites for all vineyards: Vineyards I (y= -0.0607x + 3.1147), (R^2= 0.0423), Vineyard II (y= -0.4186x + 15.48), R^2= 0.2272), in both these cultivars we have a very weak negative impact to the Phytoseiids. For vineyard IV we have a weak negative impact to the Phytoseiids (y= -0.2123x + 8.0425), (R^2= 0.6821). For vineyard III high temperature has a negative impact in population of Phytoseiid mites statistically (y= -0.2534x + 10.108), (R^2= 0.9314). The mites are poikilotherms; temperature is the main abiotic factor influencing their biology, ecology, and population dynamics [**10**].

Even during 2016 Tydeidae population is almost at one level. We have found in a higher number in Vineyard II in the period of August (3.9±0.28 mites/leaf) and in September, (3.6±0.28 mites/leaf). We have also found in high number tydeid mites in Vineyard III in the period of August (3.6±0.28 mites/leaf). We have not found tydeid mites in Vineyard III in the period May and September also we have not found tydeids in Vineyard I in the period of July and August.

Populations of tetranychid mites are lower than tydeid and phytoseiid mites.

During the 2016 we have found tetranychid mites in higher number in Vineyard I in period of August (1.4±0.1 mites/ leaf), also in Vineyard II we have found higher number of tetranychid mites (1.1±0.1 mites/ leaf). In Vineyard III and also in all vineyards during June we have not found tetranychid mites.

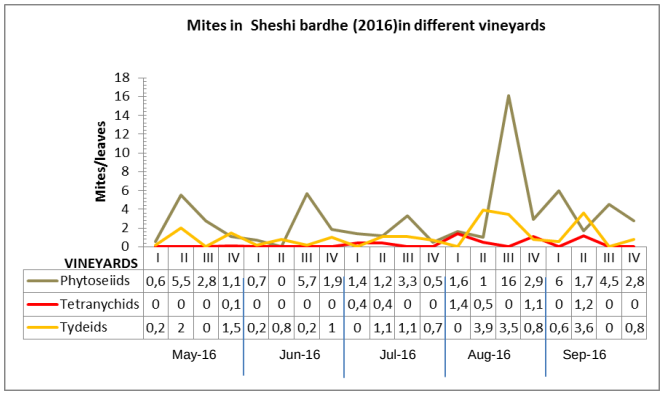

Fig.3. *Mites present in all vineyards during 2016.*

During the second year of the study we have found three species of phytoseiid mites, these species are *Amblyseius stipulatus* and *Phytoseius finitimus and Typhlodromus pyri. Phytoseius finitimus* was the dominant species among two other species. We have a significant difference (P=0.001) between *Phytoseius finitimus* and *Amblyseius stipulatus also between Phytoseius finitimus* and *Typhlodromus pyri* (P=0.001).

We have not a significant difference between *Amblyseius stipulatus and Typhlodromus pyri,* (P=0.4). These two species were found only in Vineyard I in the period of August, *A. stipulatus* (0.1±0.01 mites/leaf) and T. pyri (1.2±0.1 mites/leaf) "Figure 4".

Phytoseius finitimus were present in all vineyards. The most populated Vineyard with *Phytoseius finitimus* was Vineyard III. The least populated was Vineyard I. August was the most populated period with *Phyttoseius finitimus* and July was the least populated period. In Vineyard III in the period of August we have found highest numbers of *Ph. finitimus* per leaves (16.1±0.8). We have not found *Ph. finitimius* in Vineyard II (June 2016).

According to the Vineyards:

In Vineyard I September was the most populated period (6±0.8mites/leaf) and in August we have less populations of *Ph. finitimus* (0.3±0.8mites/leaf). In Vineyard II May was the most populated period (5.5±0.8 mites/leaf) and in June we have not found mites. The most populated period with *Ph. finitimus* in Vineyard III was the period of June (16.1±0.8 mites/leaf) and the least populated period was May (2.8±0.2 mites/leaf. In Vineyard IV August was the most populated period (2.9±0.8mites/leaf) and in July we have less populations of *Ph. finitimus* (0.5±0.8 mites/ leaf), "Figure 4".

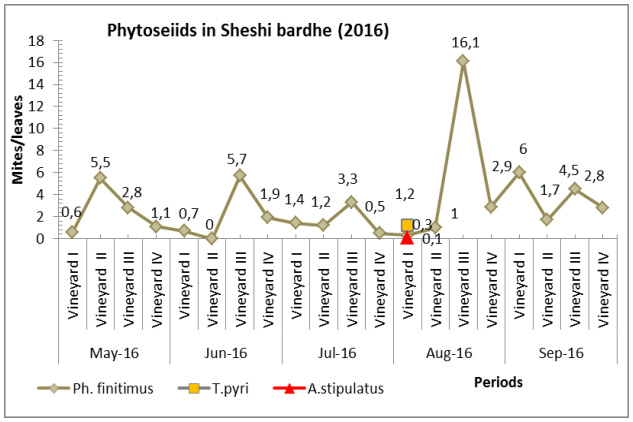

Fig.4. *Phytoseiid mites A. stipulatus, Ph. finitimus and T. pyri, present in all vineyards during 2016.*

During this study we have found in the second year (2016) much more mites than in the first year (2015), "Figure 5". During the first year of the study the annual average mites per leaves were: Vineyard I (1.22), Vineyard II (2.38), Vineyard III (2.2), Vineyard IV (1.42) and annual average for all cultivars were 1.8 mites per leaves. For the second year the annual average mites per leaves were: Vineyard I (1.8), Vineyard II (1.88), Vineyard III (6.48), Vineyard IV (1.42±1.84) and annual average for all cultivars were 3 mites per leaves.

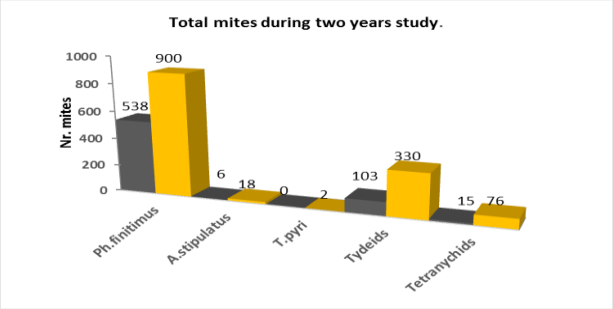

Fig.5. *All mites present in all vineyards during study*

IV. Conclusions

During the two years of study (2015-2016) that was carried out in Sheshi bardhë grape cultivar in four different vineyards, we have found phytoseiid, tydeid and tetranychid mites. During both years population of phytoseiid mites are dominant than tydeid and tetranychid mites.

In all vineyards are identified three species of the Phytoseiidae family: *Amblyseius stipulatus*, *Phytoseius finitimus* and *Typlodromus pyri*.

Phytoseius finitimus was the dominant species during two years of the study and in all vineyards. *Amblyseius stipulatus* were present in less number in period of August during 2015 and 2016 but in different vineyards, in Vineyard II during 2016 and in Vineyard I during 2015. *Typlodromus pyri* was present only during 2016 in Vineyard I in the period of August.

From the first year of the study May was the most populated period with phytoseiid mites. Vineyard II was the most populated with phytoseids (7.8±0.2 mites/leaf) during this period. From the second year of the study August was the most populated period with phytoseiid mites. Vineyard III was the most populated with phytoseids (16.1±0.8 mites/leaf) during this period. From two years study in total Vineyard III is the most populated vineyard with phytoseiid mites.

In all the vineyards we have found phytoseid mites in considerable numbers, so farmers have provided a natural control against phytophagous mites.

References

[1] B.A. Croft, "Arthropod biological control agents and pesticides". John Wiley and Sons, Inc., New York, 1990, pp. 723

[2] P.R. Demite, J.A. McMurtry, & G.J. de Moraes, "Phytoseiidae Database: a website for taxonomic and distributional information on phytoseiid mites (Acari)". Zootaxa, 2014, vol. 3795 no. 5, pp. 571–577.

[**3**] N. Duraj, "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, no. 3, pp. 73-77.

[**4**] N. Duraj, "Agricultural acarology", "Akarologjia Bujqesore", Biological control. 2006, pp. 28-38.

[**5**] V. Girolami, C. Duso, E. Refati, R. Osler; "Integrated Viticulture Fight", "Lotta Integrata in viticoltura" Chapter "Parasiti animali", 1989, pp.14-18

[**6**] I. Kasap, "The Biology and fecundity of the citrus red mite Panonychus citri (McGregor) (Acari: Tetranychidae) at different temperatures under laboratory conditions" Turk.J. Agri. For, 2009, vol.33, pp. 593-600.

[**7**] J.A. McMurtry, "Some predaceous mite (Phytoseiidae) on citrus in the Mediterranean region Entomophaga", 1977, vol. 22 no.1, pp.19-30

[8] J.A. McMurtry, G.J. de Moraes, N. F. Sourasso (2013) "Revision of the lifestyles of phytoseiid mites (Acari: Phytoseiidae) and implications for biological control strategies" Syst. Appl. Acarol., vol.18 no.4: pp. 297-320.

[**9**] G. J. de Moraes, J. A. McMurtry, H. A. Denmark, C. B. Campos. "A revised catalog of the mite family Phytoseiidae". Zootaxa, 2004, vol. 434, no.1, pp.494

[**10**] Y. T. Li, J. Y.Q. Jiang, Y.Q. Huang, ZH.H. Wang, I. P. Zhang "Effects of temperature on development and reproduction of Neoseiulus bicaudus (Phytoseiidae) feeding on Tetranychus turkestani (Tetranychidae)" Systematic & Applied Acarology 2015, vol. 20, no.5, pp. 478–490

[**11**] G. Th. Papadoulis, N.G. Emmanouel "The genus Amblyseius (Acari: Phytoseiidae) in Greece, with the Description of a New Species", Entomologia Hellenica 1991, vol 9 pp. 35-62

[**12**] H. J. Rowell, D. A. Chant & R. I. C. Hansell, "The determination of setal homologies and setal patterns on the dorsal shield in the family Phytoseiidae (Acarina: Mesostigmata)". Canadian Entomologist, 1978, vol.110, pp. 859–876.

[**13**] K. Talebi, A. Kavousi., Q. Sabahi, "Impacts of Pesticides on Arthropod Biological Control Agents, Pest technology", Global Science Books, 2008, pp.87-97

[14] M. S. Tixer, A. Baldassar, C. Duso, S. Kreiter, "Phytoseiidae in European grape (Vitis vinifera L): bioecological aspects and keys to species (Acari: Mesostigmata)" Zootaxa, 2013, vol 3721, no. 2, pp.101–142.

[**15**] H. Tsolakis, M. S. Tixer, S. Kreiter, & S. Ragusa, "The concept of genus within the family Phytoseiidae (Acari: Parasitiformes): historical review and phylogenetic analyses of the genus Neoseiulus Hughes". Zoological Journal of the Linnean Society, 2012, vol. 165, pp. 253–273

[**16**] A. Yesglayer, S. Çobanoglu, "The distribution of predatory mite species (Acari: Phytoseiidae) on ornamental plants and parks of Istanbul, Turkey". Türk. entomol. bült., 2011, vol. 1, no. 3, pp135-143.