

RESEARCH ARTICLE

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The inventory of aphids species in potato culture

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Abstract

Various species of aphids attack potato cultivated in open fields. Aphids damage plants either directly by their mouthpart system or indirectly by transmitting dangerous virus diseases. A large number of species have been found in this crop in open field cultivation. The study was conducted in 3 locations of Macedonia: Kercove, Gostivar and Tetovo. Aphids were found on two sampled varieties: Desire and Romano. Species of aphids commonly found on potato are: *Myzus persicae*, *Aphis nasturtii*, *Macrosiphum euphorbiae* and *Aulocorthum solani*. Among these four species attacking potato, *Myzus persicae* is the most common. Significant differences were found between location and years of the study based on analysis of variance.

Key words: potato, aphids species, open field.

Introduction

It is common knowledge that potato as a plant possesses immense nutritional values. As a result of such values, the areas under potato crop have shown a tendency towards growing in size. The monoculture has invariably attempted to replace the integrated agriculture [6]; thus bringing down the genetic diversity of the suitable cultivars, cutting down on the time factor of the agricultural circulation, changing the planting schedules as well as the harvesting times.

Lice dwelling on leaves are considered to be among the most dangerous pests to agricultural crops including even the potato plants [1, 2]. Of all the parts of the plant, lice like the newly-sprouted parts of the plant the most by sucking the cell juices of the leaves, flowers, young shoots and new fruit [5, 3]. Also, aphids release sugary materials upon which grow the soot fungus which might also attract other insects. In addition to the direct harm done to the plant they are capable of causing indirect damage as well because they are able to transmit dangerous viral and bacterial diseases etc [7, 4]. The biggest damage of all is done to the plots of land in which the various crop seeds are proliferated.

With the study conducted it was made possible:

- To get to know and define the main species of aphids in the potato culture;
- To get an insight into the dynamics of the population of main species of aphides in the potato culture.

Material and method

The study has been carried out during 2001-2002, in Macedonia.

Samples have been taken in three localities and more concretely: 1. Kërçovë (K); 2. Gostivar (G); 3. Tetovë (T). There have been exploited as samples *Desire* cultivar which is very diffused in Macedonia and *Romano* cultivar. For the production of the seed it has been used *Elit* category, while for market it has been used seed of second reproduction. During the potato cultivation for market and seed production all the necessary agro technical measures have been taken [8, 5].

The methodology used in taking samples and the number of cultivars included in them have been the same for both years of the study. Samples have been repeated twice for each cultivar (*Desire* and *Romano*). The size of the sample plot was 0.5 hectare, i.e. 4 sample plots in total.

For leaves lice monitoring there have been used both, the yellow vessels method (Moericke traps) and the method of lice counting per leaf.

Yellow vessels method has been perfectly combined with other methods even though it can be used as a unique method during almost the entire vegetative period. In each plot we have chosen to observe, there have been established two traps in a distance of 5 meters.

The samples to be analysed have been taken once in a week from the trap, for each plot observed and from all the localities. On this occasion, all the insects entrapped are taken and put into test-tubes where all the data are written down such as: the date of sample taking, trap's number, the number of the plot under

observation, potato cultivar etc. Later on, the samples taken are analysed and identified in laboratory with the help of determining entomological keys. The results are written down in separate tables. The identified and unidentified exemplars are conserved in alcohol 70 % and have served for further studie [1].

Leaves lice control during vegetation is done by using the method of shaking all the potato plants and lice counting according to the leaves. There have been observed 50 potato plants by accidental choice. Then, from each plant three fully grown leaves are taken at the top, in the middle and near the base of the plant. The samples to be controlled have been taken every two weeks beginning from the development of leaf size up to the end of potato vegetation.

In order to be determined the rate between the degree of leaves' damage caused by aphides and its intensity, an observation in the plots cultivated with potatoes for market near Kërçova is done.

The samples were put in four recurrences in "Romano" potato cultivar. In each recurrence 10 plants were analysed, divided into 5 groups (there are analysed 50 plants all in all , thus 10x5).

Damage degree is determined on the basis of the category of the affected plants [2, 4]. The mentioned categories were written down in capital letters and denote the degree of damage: A = up to 5%, B = 5-25%, C = 25-50 %, D = 50-75 %, E= above 75% of the damage of leaf size.

The potato plants chosen at random, are divided into three groups depending on the plant height. The plants are written down with letter A= the upper part, B= middle part and C=lower part of the plant. The sample is put according to the random plot with four recurrences with 20 plants for each recurrence.

Results and discussion

During the two-years study (2001-2002) on the distribution of the leaves aphides species in the localities where potato is cultivated, through these two methods followed, these kinds of leaves aphides are determined;

1. *Mysuz persicae* (Sulzer)
2. *Aphis nasturtii* (Kaltanbach)
3. *Macrosiphum euphorbiae* (Thomas)
4. *Aulacorthum solani* (Kalb.)

All these aphides species are distributed in the localities (Tetove) and (Gostivar), whereas in the locality (Kërçove) the species *Aulacorthum solani* is not found.

Table 1. *Mysuz persicae*, Density of lice according to localities and years of study.

Localities	Years (B)		Average (A)
	2001	2002	
Kercove	4.33	7.73	6.03
Gostivar	7.74	3.32	5.46
Tetove	26.70	16.70	21.70
Average value	12.93	9.20	Coaction A x B

Factors		A		A x B	B x A
		A	B		
DMV	1%	6.9024	3.2015	7.8518	5.5452
	5%	5.1162	2.4322	5.8792	4.2126

The largest number of lice of species *Mysuz persicae* in locality Tetove was 21.7 lice, whereas the lowest number was in locality Gostivar with 5.46 individuals. In locality Kercove the individuals' number of *Mysuz persicae* was 6.03. Considering the distribution of this kind in the localities under observation, there are considerable statistical differences among localities T and G & K. Such differences have not been evidenced between these two last localities (table 1). Differences have also been evidenced considering the years of study. Thus for example, the largest number of individuals of peach green louse was evidenced 12.93 in 2001, compared with (9.2) individuals in 2002, which means that from the point of view of statistical analysis the difference is considerable. Big differences have also been evidenced between localities and years of study. (A x B).

Table 2. *Aphis nasturtii*. Frequency of individuals according to the localities and years of study

Locality (A)	Years (B)		Average (A)
	2001	2002	
Kercove (K)	14.46	57.80	36.13
Gostivar (G)	24.45	23.87	24.17
Tetove (T)	46.67	64.00	55.30
Average value (B)	28.53	48.56	Coaction A x B

Factors		A		A x B	B x A
		A	B		
MSD	1%	16.5044	11.7160	21.6034	20.2926
	5%	12.2334	8.9005	16.2596	15.4161

Nearly at the same time, it has also been presented *Aphis nasturtii* type. These data are related to this species in the localities T and G. In K locality the presentation of this type was evidenced in the last week of June, with the largest number in the last week of August (63 individuals) (table 4).

In the context of the spread of this type of lice according to the localities and years of study, there exist essential statistical differences (table 2).

The largest number of this species was evidenced in locality T and the lowest in locality G (24.17). It is necessary to stress that there is no difference between localities G and K but there is one when we come to the years of study.

The largest number of individuals (48.56) of *A.nasturti* was evidenced in 2002 and (28.53) in 2001. The largest number of individuals of this type was in locality T, during 2002 (64.00), while the lowest was in locality K (14.46) in 2001.

In the third week of May it appeared *Macrosiphum euphorbiae* type in locality T, and later on in locality G, in the last week of the same month. The largest number of this species was captured at the beginning of September in locality T (14 individuals), whereas in locality G in the last week of June (8 individuals). In locality K this type appeared in the last week of July, whereas the largest number was captured at the beginning of September (5 individuals) (table 4).

The spread of *Macrosiphum euphorbiae* according to the localities studied is different and statistically relevant (Table 3). The largest number is evidenced in locality T (6.17), lesser than in locality K (1.970), but such differences have not been evidenced among the number of lice in localities K and G, in the years studied and their coactions.

Table 3: *Macrosiphum euphorbiae*.

Frequency of individuals according to the localities and years of study

Locality (A)	Years (B)		Average (A)
	2001	2002	
K	2.27	1.67	1.97
G	3.93	3.07	3.50*
T	5.33	7.00	6.17**
Average value (B)	3.840	3.91	Coaction A x B

Factors	A	B	A x B	B x A	
MSD	1%	2.9588	1.5115	3.4500	2.6179
	5%	2.1932	1.1482	2.5863	1.9888

The study is also extended in *Aulocorathum solani* species in locality T, in the third week of May. The maximum number of this species was evidenced in the third week of August (11.5 individuals). In locality G, this species appeared two weeks later while the maximum number was evidenced in the third week of May till the middle of June (2.5 individuals). In locality K, during the period of study, this species has

not been evidenced. In the statistical analyses when it comes to the appearance of *A. solani*, there are big differences among the number of individuals according to the localities and years of study (table 4). The largest number of this type was evidenced in locality T (4.20 individuals) while the lowest number in locality G (1.43 individuals). There are big statistical differences between the number of Aphides and years of study.

Table 4. *Aulocorathum solani* Frequency of individuals according to the localities and years of study

Localities	Years (B)		Average (A)
	2001	2002	
G	1.27	1.60	1.43
T	2.67	5.73	4.20*
Average Value	1.97	3.67*	Coaction A x B

Factors	A	B	A x B	B x A	
MSD	1%	2.3775	2.1194	301429	2.9973
	5%	1.7130	1.5710	2.3056	2.2217

Conclusion

Based on our experimental work with regard to the aphid spread in potato crop cultivated in Maqedonia, the following conclusions can be drawn: Aphids as very important pests of vegetables are very cammon and wide spread in potatoes crop cultivated in Maqedonia. From the total number of aphids recorded the following percentage belongsto the different aphids: *Myzus persicae* (21.7), *Aphis nasturtii*, *Macrosiphum euphorbiae*, *Aphis gossypii*, and other non identified aphids. According to the ANOVA there were shown to exist statistical significant differences with regard to the number of aphids species compared to control.

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