

**Agrovoc descriptors:** myzus persicae, solanum tuberosum, potatoes, monitoring, disease surveillance, disease surveys, vectors, aphidoidea

**Agris category code:** H20

COBISS koda 1.01

## **Monitoring of *Myzus persicae* (Sulzer) in potato fields in Kosovo**

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Received: October 28, 2003; accepted: June 30, 2004

Prispelo: 28. oktobra 2003; sprejeto: 30. junija 2004

### **ABSTRACT**

Among the pests infesting potato crops, green peach aphid (*Myzus persicae* Sulzer) represents one of the most virulent insects. A survey was conducted in different potato fields in Kosovo during 2000-2001 growing season to assess *Myzus persicae* build up and distribution. In this respect, the survey was set up in three most important localities for potato production in Kosovo: Vučitrn, Podujevo and Dragash. Aphid monitoring was conducted using the common method of aphid-leaf count (Raman, 1984). Based on the results of the survey, significant differences in aphid build up and distribution were observed with regard to the surveyed localities, years of survey and their interaction.

**Key words:** *Myzus persicae*, aphid-leaf count, virus disease, vector

### **IZVLEČEK**

#### **MONITORING SIVE BRESKOVE UŠI (*Myzus persicae* /Sulzer/) V KROMPIRJU NA KOSOVEM**

Siva breskova uš (*Myzus persicae* Sulzer) je ena izmed najnevarnejših žuželk med škodljivci, ki napadajo krompir. Na treh pomembnih pridelovalnih lokacijah krompirja (Vučitrn, Podujevo in Dragaš) na Kosovu je v letih 2000-2001 potekalo spremljanje (monitoring) vrste *M. persicae* z metodo štetja osebkov na krompirjevih listih (Raman, 1984). Ugotovljene so signifikantne razlike v pojavu uši med lokacijami in leti opazovanja ter medsebojne interakcije.

**Ključne besede:** *Myzus persicae*, štetje listnih uši, viroze, vektorji

## **1. INTRODUCTION**

Green peach aphid (*Myzus persicae*), represents one of the major pests affecting seed potato production for two reasons: the direct damages that are caused by the insect feeding on the plants and the indirect damages caused to potato planting materials as a virus vector (Raman, 1984; Hooker, 1986).

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The aphid's mouthparts, which are stylet-like, penetrate the leaf tissue reaching the phloem and sucking the plant sap (Goodfrey, 1997). The green peach aphid is distributed worldwide and is host of over 400 species of plants (Cloyd et al., 1998). It over-winters in form of black, shiny eggs on the bark of *Prunus* spp.: peach, plum, apricot or cherry trees (Broadbent, 1949).

The entire life span of *Myzus persicae*, from the nymph stage to the imago death, lasts up to 50 days (Toba, 1964). Authors (Van Emden et al., 1969) described the insect in detail. More than 150 plant viruses have been reported to be transmitted by this aphid species (Cloyd et al., 1998). First of all, this aphid is notoriously a vector of PLRV (Potato Leaf Roll Virus) that is transmitted in a persistent manner, whereas PVY (Potato Virus Y) is transmitted in a non-persistent manner (Radcliffe et al., 1999). It is also well known that both, the nymphs and the adults are equally capable to transmit plant viruses, but since the adults are more mobile the latter play by far the most important role (Flanders et al., 1991).

There are different methods for controlling green peach aphids, all of them relying in the use of chemicals. It is assumed that critical levels of *Myzus persicae* are reached when more than 5 winged aphids are caught per trap (yellow water traps or Moericke's traps) per week. Other assumptions are for 5–10 aphids, mostly wingless, detected per 100 leaves (Schreiber et al., 2003). Recently, the development of insect resistance towards most of the insecticides used for its control has been observed (French-Constant et al., 1988; Gelski, 2001). On the other hand, as a result of intensive chemicals treatments that may cause the disappearance of the natural enemies, an increase in aphid population has been observed (Oetting, 1985; Rowe, 1993). Systemic, granular insecticides, which are applied at planting time, provide a certain protection against green peach aphids during the critical and most susceptible stages of potato growth (Powell, 1980). Among the natural enemies of *Myzus persicae* we can include lacewings, ladybugs or lady beetles, parasitic wasps, predacious midges and pathogenic fungi that can reduce the aphid populations and keep them below threshold level (Bailey, 1993). Weather conditions also reportedly contribute to significantly decrease aphid populations, influencing also insect mortality (Barlow, 1962).

Taking into consideration the fact that green peach aphid (*Myzus persicae*) is always present in potato crops in Kosovo, the main goals of the survey were to assess aphid build up and distribution in the surveyed localities during two growing seasons (2000–2001).

As climatic conditions may affect aphid build up and distribution, we decided, therefore, to collect meteorological data from the stations based in Dragash, Podujevo, Mitrovica (Tab. 1), the latter being situated very close to the locality of Vuçitrn.

**Tab. 1.** Meteorological data during investigation period (2000 - 2001)

Month	DRAGASH		VUÇITRN		PODUJEVO	
	Temperature (°C)	Precipitate (mm)	Temperature (°C)	Precipitate (mm)	Temperature (°C)	Precipitate (mm)
January	-1.95	54.6	2.25	33.5	0.75	38.4
February	1.6	51.4	2.3	37.3	2.1	38.0
March	3.9	51.3	8.1	29.6	6.5	36.8
April	6.4	55.8	10.6	79.7	11.0	47.7
May	12.0	73.3	15.3	61.6	15.0	72.8
June	14.7	60.0	16.4	55.9	19.7	60.9
July	16.7	51.7	22.6	64.0	22.1	48.4
August	18.2	42.2	20.9	33.3	21.2	44.8
September	14.9	57.7	15.7	63.2	18.0	44.6
October	11.4	63.8	11.6	63.3	17.3	56.0
November	3.7	79.0	5.0	60.6	7.2	63.7
December	0.9	69.15	-4.4	45.6	2.6	53.3
Average	8.5	710.4	11.5	627.9	13.7	605.7

Dragash is situated at 42°04' latitude, 21°39' longitude, and at the altitude of 1060 m above sea level. Podujevo is at 42°55' latitude, 21°12' longitude, and at the altitude of 620 m above sea level, whereas Vuçitrn has the following geographical parameters: 42°46' latitude, 21°04' longitude and altitude of 500 m above sea level.

From the above table, it can be extrapolated that the average temperatures during the two growing seasons (2000-2001) are as follows: 8.6°C recorded in Dragash, 11.5°C in Vuçitrn and 13.7°C in Podujevo. The coldest month in Dragash (-1.9°C) and Podujevo (0.6°C) is January, while December is the coldest month in the locality of Vuçitrn (-2.2°C).

The average of rainfall recorded in the two examined years ranged from 710.4 mm in Dragash, to 627.9 mm in Vuçitrn and 605.7 mm in Podujevo (Tab. 1). The amount of rainfall during the growing season (April-August) was very unsuited to potato cropping with the following average figures: 283.0 mm (Dragash), 294.7 mm (Vuçitrn), and 274.7 mm (Podujevo). It is very likely that potato crops under water stress, due to limited rainfalls and absence of irrigation, suffer more of the damages caused by aphids.

## 2. MATERIALS AND METHODS

The varieties of potato used in our investigations were Romano (mid-early) and Desiree (mid-late to late), respectively of class Elite and A. The Dutch seed company Agrico provided the seed for the experiment. Planting was done during the month of April in the localities of Vuçitrn and Podujevo, while in Dragash occurred in May, in both years of investigation. Each variety was planted in two separate experimental blocs of 1.0 ha, with two replications. The experimental plot size was of 0.5 ha, thus in total there were four experimental plots in each locality.

Potato tubers were planted at an inter-row distance of 75 cm and an intra-row distance of 25 cm. The seed rate ranged from 2.0 to 2.5 t/ha depending on the seed grade. Aphid monitoring was conducted using the aphid-leaf count method described by Raman (1984). According to that method, the aphid critical level is reached when 5-10 wingless aphids are caught every 100 potato leaves. Leaf samples were taken on a diagonal transect across the field, at three different plant levels: low, mid and top sections of the potato plants. Relevant data such as

the sampling date, the concerned potato variety, etc., accompanied each sample that was sent to the laboratory of the Crop Protection Dept. of the Faculty of Agriculture in Prishtina, Kosovo. In the laboratory, aphid species were identified using a stereo binocular microscope with the aid of appropriate keys (Teulon, 1999; Teulon et al. 1999), (Mac Gillivray, 1979, 1986; Blackman & Eastop, 1984).

The data were analyzed by using ANOVA and tested by LSD ( $P < 0.01$  and  $0.05$ ).

### 3. RESULTS AND DISCUSSION

The distribution and time of appearance of *Myzus persicae* differed according to the locality and the year under survey. No significant differences were observed with regard to the two potato varieties.

Using the aphid-leaf count method for the monitoring of *Myzus persicae*, the first appearance of the aphid in the locality of Vuçitrn was recorded during the first week of May, while in the localities of Podujevo and Dragash in the second half of May and the third week of June, respectively.

The presence of *Myzus persicae* in potato crops was recorded during the entire growing season in all the investigated localities, but the frequency with regard to the localities was different (Tab. 2). Vuçitrn was the locality where *Myzus persicae* reached the highest level with a number of 18.7 aphids (average of two years), recorded on potato plants of the var. Romano in the first week of July, and 17.5 aphids on plants of the variety Desiree in the first week of August. In Podujevo, the peak of aphid infestation on potato plants of the variety Desiree was noticed during the first week of July (12.0), whereas on plants of the variety Romano it was during the first week of August (9.7). With regard to Dragash, the highest number of *Myzus persicae* was recorded on both potato varieties in the first week of August (Romano: 11.0; Desiree: 5.2).

**Tab. 2.** *Myzus persicae*. Average number of aphids/100 leaves (2000-2001)

Locality	Variety	Frequency of aphid sampling									
		1	2	3	4	5	6	7	8	9	10
Dragash	Romano	0	0	0	2.2	6.2	8.2	11.0	5.5	6.2	3.7
	Desiree	0	0	0	0.5	3.3	2.7	5.2	2	2	3
Podujevo	Romano	0	0.8	7.0	7.3	8.8	4.0	9.7	7.8	5.3	4.5
	Desiree	0	2.7	10.3	11.7	12.0	5.7	10.3	4.0	7.5	4.2
Vuçitrn	Romano	0.5	2.5	2.2	7.7	18.7	11.7	17.5	9.7	13.7	5.3
	Desiree	0.6	1.0	5.8	10.0	8.7	9.7	17.5	12.2	10.3	0.8

Analyzing the results with ANOVA (Tab. 3), it can be deducted that there are significant differences with regard to the distribution of aphids by locality, year of investigation and the interaction locality x year. On the other hand, no significant difference was reported with regard to the potato varieties surveyed.

The highest number of *Myzus persicae* was recorded in the locality of Vuçitrn (10.1), whereas the lowest number of aphids was recorded in the locality of Dragash (3.8). Statistical analysis of the results indicates that there are significant differences between the three localities.

Similarly, highly significant differences were noticed with regard to the year of investigation. In fact, the highest number of aphids (*Myzus persicae*) was recorded in 2001 with 9.5 units vs. 4.7 recorded in 2000. With regard to the frequency distribution of the aphid, the interaction locality x potato variety was highly significant in the case of Dragash x var. Desiree (2.3), and Vuçitrn x var. Romano (10.8). The highest number of *Myzus persicae* was recorded on potato plants of the variety Romano in the locality of Vuçitrn (10.8), whereas the lowest number of this aphid species was recorded on plants of the var. Desiree in Dragash (2.3).

**Tab. 3.** Frequency of *Myzus persicae* during investigation period

Locality (A)		Variety (B)	Year (C)		Average (AB)		Average (A)	
			2000	2001				
Dragash		Romano	4.1	6.5	5.3		3.8**	
		Desiree	2.2	2.4	2.3**			
		Average (AC)	3.2	4.5				
Podujevo		Romano	4.2	9.4	6.87		7.5**	
		Desiree	4.0	12.4	8.21			
		Average (AC)	4.1	10.9				
Vuçitrn		Romano	4.8	16.8	10.8**		10.1	
		Desiree	9.0	9.7	9.4			
		Average (AC)	6.9	13.2	Average (B)			
Variety x Year (BC)		Romano	4.4	10.9			7.6	
		Desiree	5.1	8.2			6.6	
Average year (C)			4.7	9.5**			A x B x C*	
Factor		A	B	C	AB	AC	BC	ABC
LS	1%	3.3	1.7	2.8	3.4	5.6	4.4	9.1
D	5%	2.5	1.3	2.2	2.4	4.0	3.2	6.2

Significant differences (Tab. 3) were also reported in the interaction locality x potato variety x year of investigation (A x B x C). With regard to the year of investigation, the highest number of *Myzus persicae* was recorded on potato plants of the var. Romano in Vuçitrn in 2001 (16.8), whereas the lowest number of this aphid species was recorded on plants of the var. Desiree in Dragash in 2000 (2.2).

The important presence of *Myzus persicae* in Vuçitrn is due to several factors: (a) *potato mono-cropping pattern*, traditional in this area, with consequent favourable conditions to the over-wintering of this aphid species, (b) *high N application*, which stimulates vegetative plant growth, thus increasing plant susceptibility to aphids, (c) *presence of a mild climate* compared to the other localities, (d) *low altitude level*, with higher aphid pressure than the other localities, (e) *insecticide spraying*, since farmers use very frequently and at high rates broad-spectrum insecticides that eliminates beneficial insects as well. Several authors confirm the above thesis. In fact, it was

proved (Janson et al., 1986) that green peach aphid populations tend to increase with increasing levels of nitrogen fertilization, while others (Barlow, 1962) report about the correlation between climatic conditions and the level of aphid pressure. Finally, according to other authors (Stephanie Bailey, 1993; Oetting, 1985; Rowe, 1993), the intensive use of broad-spectrum insecticides contributes to reduce the presence of aphids' natural enemies.

#### 4. CONCLUSIONS

Based on two-year experimental work with regard to the study of *Myzus persicae* distribution in the main potato production areas of Kosovo, the following conclusions can be drawn:

- Appearance of *Myzus persicae* differed with regard to the locality and year of investigation.
- *Myzus persicae* was firstly recorded in Vuçitrn (first week of May), while appeared later in Dragash (third week of June).
- The two potato varieties, Romano and Desiree, were equally infested by *Myzus persicae*, meaning that there was no variety less susceptible than the other with regard to the pest.
- Among the investigated localities, only Dragash proved to be suitable for seed potato production because the number of caught aphids was below threshold levels.
- Because of the increasing levels of broad-spectrum insecticides used in certain areas of the country, and consequent reduction of beneficial insects, it would be extremely useful to investigate the feasibility of an Integrated Pest Management strategy at farmer level.

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