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Abundance and dominance of aphid species collected in the depression area of Targu Secuiesc

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Abstract Virus infection trigger requires three factors: host plant (potato), virus and the vector (aphids). Potato virus transmission from one field to another and virus transmission from one plant to another within a potato culture is attributed primarily to aphids. This paper presents the abundance and dominance of aphid species as virus vectors in the Depression of Targu Secuiesc, the main growing area for seed potato. It is very beneficial for potato growers to know the potato aphid fauna structure, as they can control potato pests.

Key words

aphids, potato, abundance, dominance

In our country potato growing season coincides with the intensive growth of aphid population, especially species that transmit potato virus diseases [4]. Under favorable conditions can evaluate in a year 5-25 generations. A female can have at the 5th generation 6 million descendants [2]. Under favorable conditions for development aphids become so numerous, that the number of copies that feed on the vegetation of a quarter hectare can exceed 2000 million [1].

Aphids are one of the most important entomological groups in terms of implications for agriculture [5]. The main objective of seed potato producers is not only the control of aphids already installed in the culture, but also finding the most effective means of preventing their dissemination and virus disease transmission. Aphids constitute the largest group of plant virus vector [3].

One of the main objectives of the Plant Protection Department at the Potato Research and Development Station Targu Secuiesc is to monitor and observe the virus degeneration of potato, but the observation of potato virus degeneration cannot be complete without identifying the aphid species-vectors of virus. Aphids are a major threat to seed potato crop, because they transmit the viruses from one plant to another. In modern seed potato production special attention is given to study the behavior of aphids, as seed potato quality depends largely on the level of virus infection.

Research Methods and Materials

The experimental field was 50 m^2 and the potato varieties used were *Gared, Tentant, Astral* and *Magic*. To determine the potato aphid fauna structure, the population parameters of insects and the highlighting of causal factors that cause certain phenomena, were made collections of biological material:

- Using monochromatic traps (yellow) with adhesive, each trap having identical surface. In each plot were placed about 3 traps, mounted on a wooden base at a height of 60 cm from the ground (Fig. 1). Traps were placed diagonally across each plot, at one third of the plot length, thus avoiding marginal effect. They were changed weekly from May to August.
- Visual observations were made on a total of 10 plants from each plot during the growing season of potato and maximum activity of insects.
- Periodic collection of 100 potato leaves to determine the number of aphids without wings.
- Determination of insect density on plants through visual observations and manual collection over a linear course of 10 m.

Fig. 1 Monochromatic traps

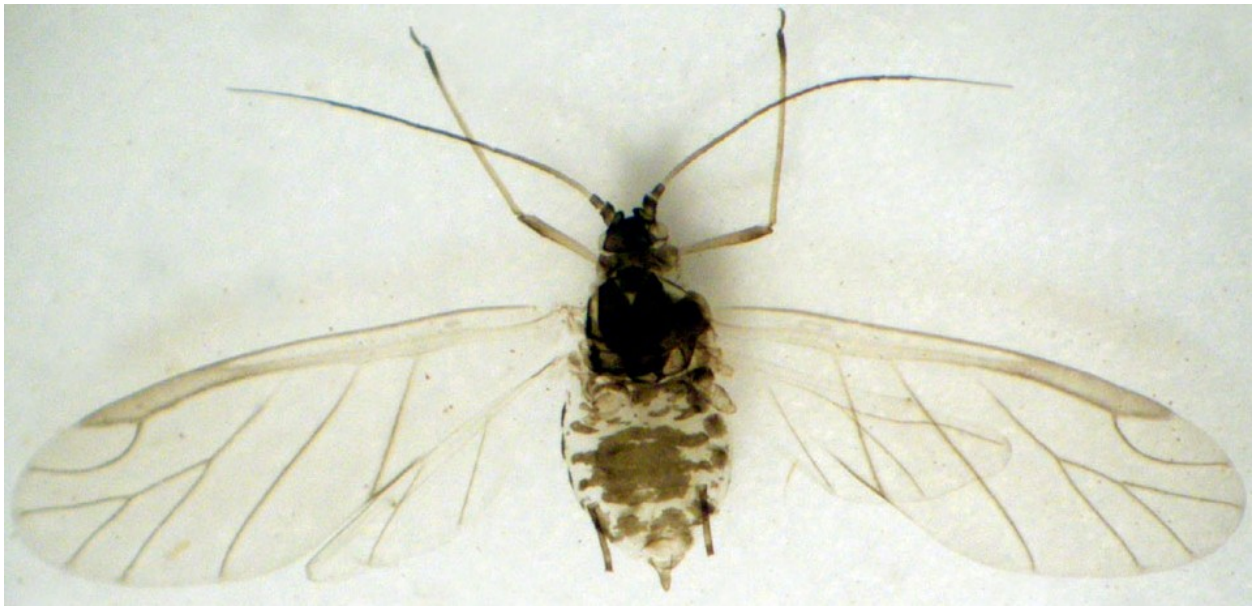

Fig 2. Myzus persicae Sulzer (orig.)

Results and Discussions

In the 3 years of experiment there were identified 15 species of virus vectors and were collected 947 aphid virus vectors. Among the species collected the *Aphis fabae* was the most dominant with 32,70% and with a total abundance of 449 individuals. The second dominant species collected in the 3 years under study was the *Aphis frangulae* with 13,17% and with a total abundance of 180 individuals. In the three years of the experiment among the species of aphids as virus vectors the *Aulacorthum solania* had the lowest abundance with one single individual collected.

Analyzing the results obtained in 2009 we can see that in the experimental field there were collected 383 aphids, among which 257 insect vectors with a dominance of 67,10% and 126 aphids from other species with 32,90%. In this year the most abundant species were *Aphis fabae* with an abundance of 143 individuals and with a dominance of 37,33%, the *Aphis frangulae* with an abundance of 60 individuals and with a dominance of 15,66% (Table 1).

In 2010, following the aphid evolution there were determined 11 aphid species as virus vectors, and there were collected 568 individuals, 343 individuals were disease-carrying insects and 225 other aphis species (**Table 2**). This year as in previous years under study the most abundant aphid species was the *Aphis fabae* with an abundance of 202 individuals, followed by *Aphis frangulae* with an abundance of 50 individuals, in this year, too, the dominance of aphids as virus vectors is evident, 60,38% compared to 39.62%.

Table 1

Abundance and dominance of aphid species in the experimental field in 2009

Species	Number of individuals collected				Total annual	
	May	June	July	August	Abundance	Dominance
Acyrthosiphon pisum	2	16	-	-	18	4.69
Aphis fabae	37	100	3	3	143	37.33
Aphis frangulae	29	24	7	-	60	15.66
Aphis nasturtii	-	-	1	-	1	0.26
Aphis sp.	4	9	1	5	19	4.96
Aulacorthum solani	-	-	-	1	1	0.26
Brachycaudus helichrysi	-	1	3	-	4	1.04
Myzus persicae	-	2	-	4	6	1.56
Phorodon humuli	-	2	-	-	2	0.52
Rhopalosiphum padi	-	2	-	1	3	0.78
Virus vector species	72	156	15	14	257	67.10
Other species	21	78	20	7	126	32.90
Total	**93**	**234**	**35**	**21**	**383**	

Table 2

Abundance and dominance of aphid species in the experimental field in 2010

Species	Number of individuals collected				Total annual	
	May	June	July	August	Abundance	Dominance
Acyrthosiphon pisum	-	6	-	-	6	1,05
Aphis fabae	46	137	19	-	202	35,56
Aphis frangulae	9	32	9	-	50	8.80
Aphis nasturtii	-	-	3	-	3	0,52
Aphis sp.	1	17	4	1	23	4.04
Brachycaudus helichrysi	-	8	-	4	12	2,11
Macrosiphum euphorbiae	-	3	-	-	3	0,52
Myzus persicae	1	9	-	-	10	1,76
Phorodon humuli	-	17	1	5	23	4.04
Rhopalosiphum padi	1	1	2	2	6	1.05
Acyrthosiphon pisum	-	5	-	-	5	0.88
Virus vector species	**58**	**235**	**38**	**12**	**343**	**60.38**
Other species	**13**	**167**	**43**	**2**	**225**	**39.62**
Total	**71**	**402**	**81**	**14**	**568**	

Table 3

Abundance and dominance of aphid species in the experimental field in 2011

Species	Number of individuals collected				Total annual	
	May	June	July	August	Abundance	Dominance
Acyrthosiphon pisum	1	2	7	-	10	2.36
Aphis craccivora	34	20	5	-	59	13.98
Aphis fabae	7	41	53	3	104	24.64
Aphis frangulae	4	44	20	2	70	16.58
Aphis gossypii	1	2	1	-	4	0.94
Aphis nasturtii	1	4	2	-	7	1.65
Aphis sp.	5	17	24	2	48	11.37
Brachycaudus helichrysi	3	-	1	-	4	0,94
Cavariella aegopodii	9	-	13	-	22	5.21
Hyalopterus pruni	6	2	-	-	8	1.89
Phorodon humuli	1	1	7	1	10	2.36
Ropalosiphum padi	-	1	-	-	1	0.23
Virus vector species	**72**	**134**	**133**	**8**	**347**	**82.22**
Other species	**23**	**12**	**39**	**1**	**75**	**17.78**
Total	**95**	**146**	**172**	**9**	**422**	

In the last year of study, in 2011 there were identified 12 species of aphids as virus vectors, and there were collected 422 individuals, of which 82.22 % were virus vector species (347 insects) and 17.78% were other species (75 insects) (**Table 3**). In this year the most abundant species was *Aphis fabae*, followed by *Aphis frangulae* with 70 individuals and *Aphis craccivora* with 59 individuals collected.

Conclusions and Recommendations

- In the years of the experiment it has been found that the aphids as virus vectors had a dominance of 68.97% compared to other aphid species that had a dominance of 31.03%.
- In 2009 the most abundant species was the *Aphis fabae* with 143 individuals, with a dominance of 37.33%, followed by *Aphis frangulae* with 60 individuals and a dominance of 15.66%.
- In 2010, as in previous years of the experiment the most abundant was the *Aphis fabae* with 202 individuals, followed by the *Aphis frangulae* with 50 individuals, and in this year, too, the dominance of aphis species as virus vectors was evident, with a dominance of 60.38% compared to 39.62%.
- In 2011 the most abundant species was the *Aphis fabae*, followed by *Aphis frangulae* with 70 individuals and *Aphis craccivola* with 59 individuals
- In the three years of the experiment among the species of aphids as virus vectors the *Aulacorthum solania* had the lowest abundance with one single individual collected
- Species *Myzus persicae*, one of the most dangerous species, had a very low abundance and dominance, there were collected a total of 16 individual and with a dominance of 1.16%.

References

1.Cubelac Erika – 2011, Perfecţionarea tehnologiei de producere a cartofului pentru sămânţă în microzona închisă Şinteu din judeţul Bihor. Teză de doctorat. USAMV Cluj-Napoca

2.Donescu Daniela – 1996, Afidele cartofului în Ghid practic de protecţie a cartofului, Editura Ceres.

3.Donescu Daniela – 1997, Rolul afidelor ca vectori ai virusurilor cartofului. Anale I.C.P.C. Braşov

4.Draica C., Cojocaru N., - 1996, Rata infecţiei cu virusuri: un criteriu pentru promovarea soiurilor de cartof. Anale I.C.P.C. Braşov, XXIII.

5.Morar G., - 1999, Producerea şi înmulţirea cartofului pentru sămânţă.Ed. Risoprint Cluj-Napoca.