

ORIGINAL SCIENTIFIC PAPER

Population of *Rhopalosiphum padi* (L.) on different varieties/lines of oats (*Avena sativa* L.)

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Abstract

The population of aphid *Rhopalosiphum padi* (L.) was studied during the period 2006 – 2007 on oats varieties/lines (Dunav 1, Jubilei 4, Ruse 8, Resor 1, L 615 - 3, 354 - 2, 44 - 10, CR 146 – 11, CR 146 – 12 and Z 137-2-2) in Karnobat, Bulgaria. Aphid population appeared on all varieties/lines on 16 April and increased gradually up to 18 May 2007. The most resistant and most susceptible to aphid infestation varieties/breeding lines are investigated.

Key words: *Rhopalosiphum padi* (L.), oats resistant, varieties/lines

Introduction

In Bulgaria studies on aphids in cereals with merged surface are made primarily by Grigorov (1963, 1980). The author reported 5 migrant species and 4 sedentary species, among which is *Rhopalosiphum padi* (L.).

To improve the selection for resistance of wheat to aphids attack several authors investigated the response of different varieties/lines (Riazuddin et al., 2004; Aslam et al., 2004). Such studies in oats have not been conducted in Bulgaria until now. The aim of the study was to determine the varieties/lines with the most numerous population of *Rhopalosiphum padi* (L.), and its impact on yield of grain.

Material and method

Experiment was carried out at the Institute of Agriculture - Karnobat, during the 2006-2007 in 10 varieties/lines of oats - Dunav 1, Jubilei 4, Rouse 8, Resor 1, L 615 - 3, 354 - 2, 44 - 10, CR 146 - 11, CR 146 - 12 and Z 137-2-2. Plots were sown at optimal autumn date - in the beginning of October. The cultural practices, were made according to the standard technology for the region (Savova et al., 2005). The number of aphids was determined by direct counting on 10 oat stems in each variety/line in spring vegetation period (from 15 March to 25 May) in every 7-8 days. The taxonomic analysis of aphids was carried out by Emden (1972) and Blackman & Eastop (1984). According to the degree of attack by aphids conditionally divide the varieties/lines into three groups: weakly infested (1 to 3, number what number? number of *R. padi* / a stem), medium infested (over 3 to 8 number/a stem) and strongly infested (over 8 number/a stem). Mathematical treatment of data was performed by Statistica 6.

Results and discussion

The weather condition in 2006/2007 in Karnobat region is characterized by dry autumn, warm winter, and less rainfalls in the spring, hot and dry summer. In the fall growing season on the oats specimens of *Rhopalosiphum padi* L. are not seen. During the spring growing season the air temperatures was higher than the average perennial values contributed to the development of aphids, but the accompanying drought, which lasted until mid-May restrict development of their populations. The lack of rainfall in April, when the generative organs was executed, had a negative effect on the plants growth and

development and reflected accordingly on the aphids' density (Tables 1 and 2). *Rhopalosiphum padi* was found in varieties/lines of oats in the middle of April in the minor density. The highest density at the beginning of the third decade of April was measured in breeding line 354-2 (1.4 nb. aphids/stem). In the first ten days of May, *Rhopalosiphum padi* reached its peak at line 44-10 (17.5 nb. aphids/stem). At the end of the first decade of May aphids density begins to decrease and at the end of the second decade of the month do not met (Figure 1). This is probably due to heavy rainfall in the second half of May, (Table 2), which passed on most of aphids and therefore very high air temperatures and low atmospheric humidity, which in turn accelerated the maturation and coarsening of plants and led to their unsuitability for feeding of aphids.

Due to adverse weather conditions during 2007 the attack of aphids on oats yields in all varieties/lines was below average for the period 2000 - 2005 (Figure 2). Investigated is the relations between the density of aphids (number aphids of stems) and reduction of yield varieties/lines of oats in %. Average correlation was found between the two attributes - $r = 0.42$, $p < 0.05$ (Figure 3).

The group is attacking a weak shall include all varieties/lines except 44-10. The most - sustained by this group variety Z 137-2-2, in which the yield decreased by only 9.28 % in the density of aphids-1.4 number of stem.

To be heavily attacked a group of 44-10 in the fall line density of 17.5 aphids number of stem and yield decreased by almost 42%.

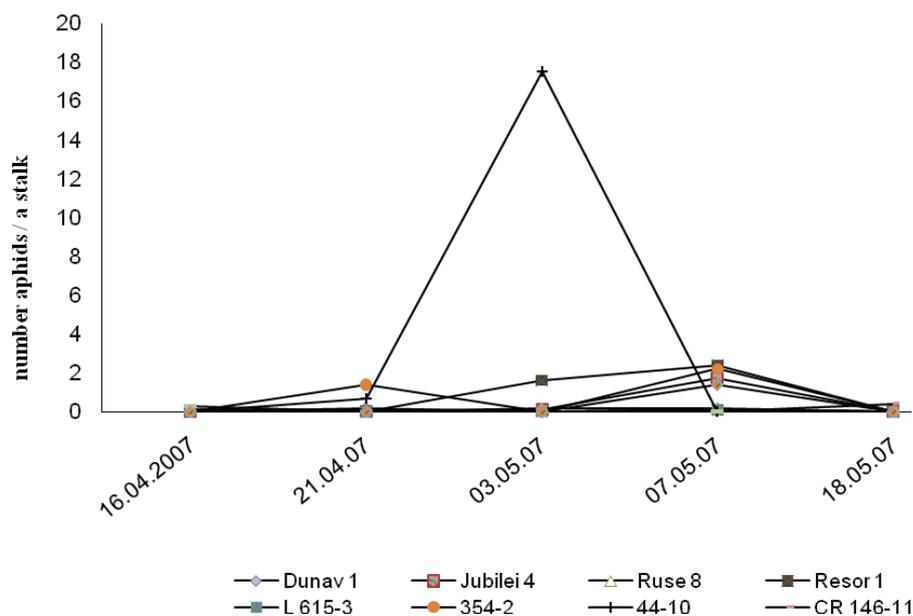


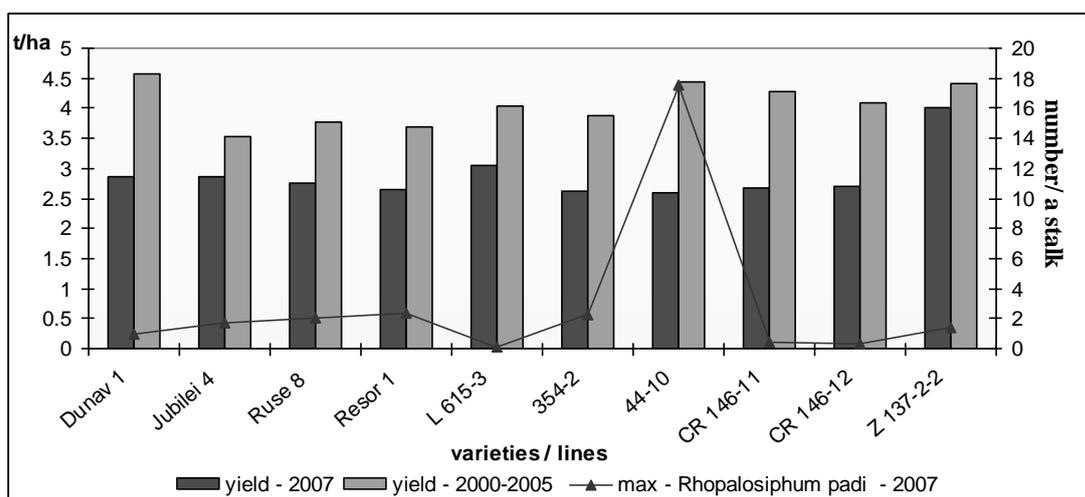
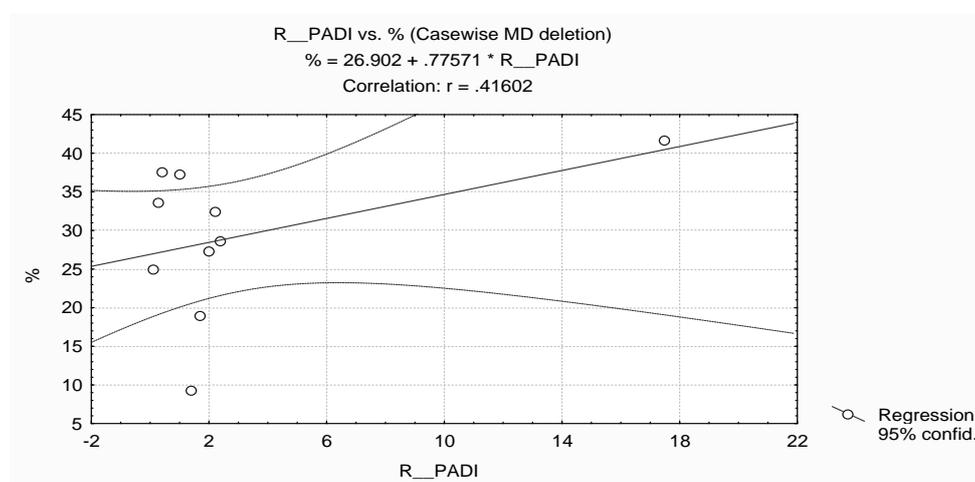
Fig 1. Population of *Rhopalosiphum padi* on different varieties/lines of oats

Table 1. Air temperature ° C - 2007

Month	March	April	May	June	
Decades	I	6,8	10,1	15,5	19,4
	II	8,5	9,5	17,6	22,5
	III	5,8	12,1	19,4	25,7
Average monthly temperature	7,0	10,6	17,6	22,5	
Perennial values(1931 – 2005r.)	5,2	10,5	15,5	19,5	
± Perennial values	1,8	0,1	2,1	3,0	

Table 2. Rainfall, mm – 2007

Month	March	April	May	June	
	I	4,0	7,1	2,1	34,8
Decades	II	0,1	3,4	14,1	14,5
	III	15,6	1,8	42,2	8,6
Amount of rainfall for month	19,7	12,3	58,4	57,9	
Perennial values (1901 – 2005 r.)	34,0	47,7	57,8	69,0	
± Perennial values	-14,3	-35,4	+0,6	-11,1	

Fig. 2. Maximum multiplication of *Rhopalosiphum padi* and yield of varieties of oatsFig. 3. Relation between density of *Rhopalosiphum padi* and reduce the yield of oats in %.

Conclusions

Maximal population density of *Rhopalosiphum padi* is found in breeding line 44 – 10 (17.5 aphids number of stems).

Medium correlation between *Rhopalosiphum padi* density and yield reduction of oat varieties/breeding lines has been established ($r = 0.42$, $p < 0.05$). The most - resistant to *Rhopalosiphum padi* attack is a line Z 137-2-2. Line 44-10 has the biggest grain yield decrease (42%).

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