

Original scientific paper

## Propagation and species composition of aphids infesting oats

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### Abstract

The research has been carried out in the Institute of agriculture – Karnobat during the period 2005 – 2008. The species composition, population dynamics and aphid's ratio in oat variety Dunav 1 has been investigated.

Key words: aphids, population dynamics, oats.

### Introduction

Oat is widely spread multipurpose crop, due to its valuable grain qualities – high protein content, oils, irreplaceable amino acids and fibers, rich in vitamins and mineral components, with good energy characteristics. Oat crops are invaded by different pests among which with specific agronomic importance are aphids (Savova et al., 2005). In favorable climate conditions they are reproducing in great number and cause significant damages to the crop by increasing the grain yield. They harm the plant by sucking juice which consequently leads to formation of whitish blotches necrotizing later. This stresses the plant and prevents its normal growth and development. In dry years the all plant dies. Some aphid's species inject toxins during their feeding as well as transmit virus diseases (Gospodinov and Mitov, 1971; Grirogov, 1980; Kovachevski et al., 1999; Drees and Jaackman, 1999; Krasteva and Bakardjieva, 2000). Investigations on the aphid's species composition in cereals have been made (Grigorov, 1980; Petrovič, 1996), but they are not sufficiently evaluated in oat crop. This imposed the necessity of research on the aphid species' composition and population dynamics in this crop.

### Material and methods

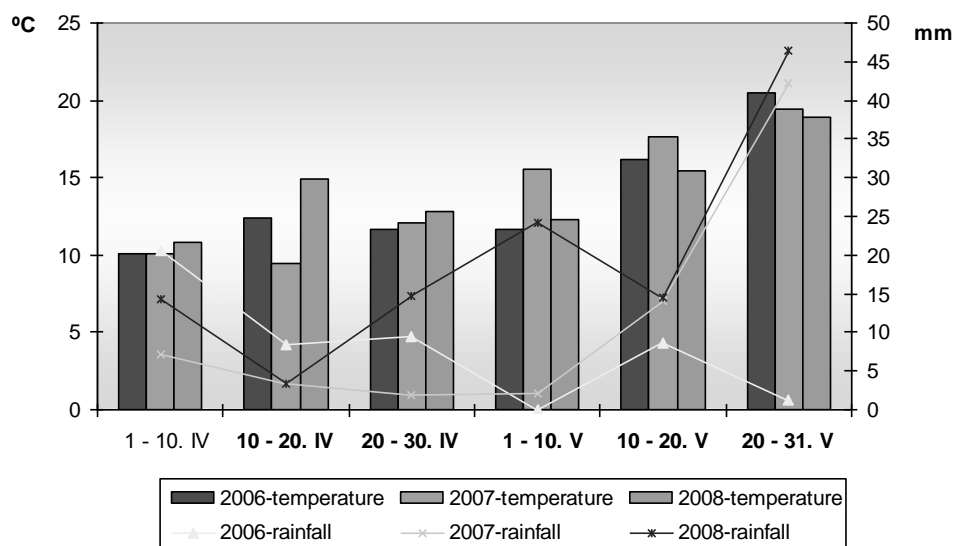
The trial has been conducted in the Institute of agriculture – Karnobat during the period 2005 – 2008. Oat variety Dunav 1, established as standard for Bulgaria, has been used. Plots were sown at optimal autumn date. The cultural practices, not subject of this research, were according the standard technology for the region (Savova et al., 2005). The aphid's number has been determined by direct measuring on 10 stalks from emergence to full ripening in every 7-10 days. Taxonomic analyses of the aphids are accordingly Emden (1972) and Blackman & Eastop (1989).

### Results and discussion

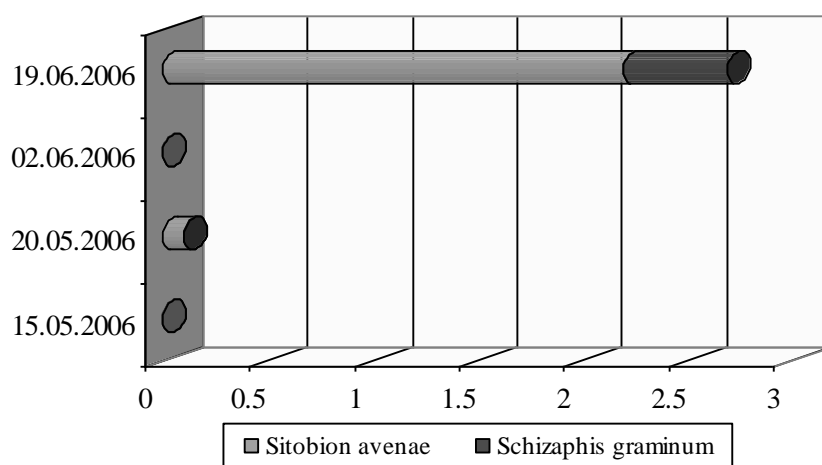
In the beginning of the oat's vegetation period in autumn no aphids were observed. In the spring three species are found - *Sitobion avenae* (F.), *Schizaphis graminum* и *Rhopalosiphum padi* (L.). In 2006 *Sitobion avenae* (F.) и *Schizaphis graminum* (Rond.) were present, in 2007 - *Sitobion avenae* (F.) и *Rhopalosiphum padi* (L.), and in 2008 all of them were discovered (Table 1). The different climate conditions in the successive years during the reproduction period of aphids (Fig. 1) influenced the species composition.

**Table 1. Composition of aphid species in oat.**

Species	2006	2007	2008
<i>Sitobion avenae</i> (F.)	+	+	+
<i>Schizaphis graminum</i> (Rond.)	+	-	+
<i>Rhopalosiphum padi</i> (L.)	-	+	+



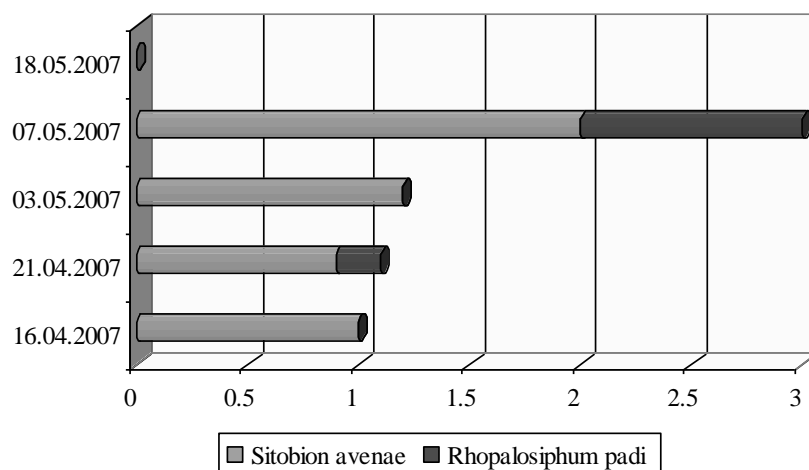
**Graph 1. Climate conditions for the period April –May 2006 – 2008.**



**Graph 2. Population dynamics of aphids in oat variety Dunav 1 in 2006.**

The Karnobat district had dry spring and hot summer in 2006 (Graph 1). The climate conditions were unfavorable for aphids’ development. They reached maximum number after mid June – 2.7 nb/stalk. Later the roughness of oat stalks make them inappropriate for feed and aphids were no longer observed (Graph 2).

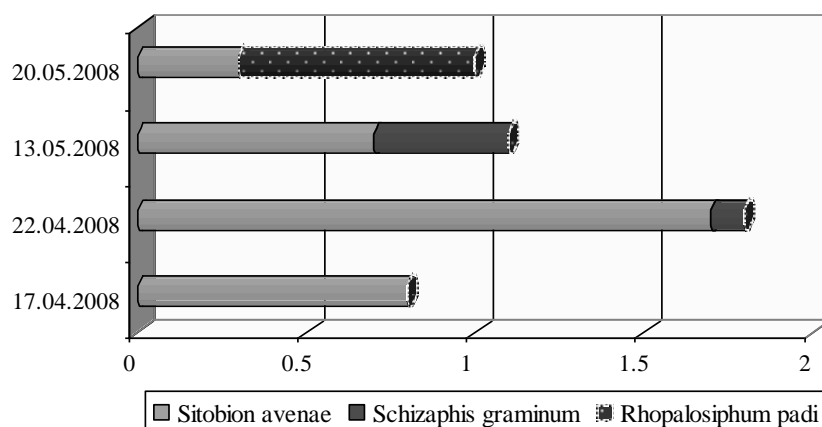
The next year brought to Karnobat region poor rainfall in the spring, hot and dry summer (Graph 1). This provoke faster development and aphids attained the maximum number - 3 nb/stalk, in the beginning of May (Graph 2). In the second half of the month no more aphids were found because of the rainfalls (50 l/m<sup>2</sup>) which washed out the insects.



**Graph 3. Population dynamics of aphids in oat variety Dunav 1, 2007.**

The spring of 2008 is characterized by favorable for plant development combination of temperature and rainfall (Graph 1). During this period in the field are found aphids from genera *Sitobion avenae*, *Schizaphis graminum* and *Rhopalosiphum padi*. Maximal population size – 1.8 nb/stalk, was established in the beginning of the third ten-days of April. Later the population density decrease rapidly and in the end of May no more insects were found in the plots, probably due to the abundant rainfalls washing them from the plants.

The different climate conditions in the successive years, during the period of aphid reproduction (Graph 1), influenced their population dynamic.



**Graph 4. Population dynamics of aphids in oat variety Dunav 1, 2008.**

**Table 2. Aphid ratio, %**

Species	2006	2007	2008
<i>Sitobion avenae</i>	82.14	80.95	74.47
<i>Schizaphis graminum</i>	17.86	0	10.64
<i>Rhopalosiphum padi</i>	0	19.05	14.89

During the spring of 2006 aphids' species were observed - *Sitobion avenae* и *Schizaphis graminum* in ratio 82.14 % to 17.86% correspondingly. In 2007 *Schizaphis graminum* was not found, but *Sitobion avenae* и *Rhopalosiphum padi* were in proportion 80.95 % to 19.05 %. In 2008 all three species were present as follow - *Sitobion avenae* – 74.47%, *Schizaphis graminum* – 10.64 % and *Rhopalosiphum padi* – 14.89 %

During the research period, independently of the climate conditions and plant development, *Sitobion avenae* were predominant in oat variety Dunav 1. Weather permitting and crop growth determined occurrence of the other species in insignificantly low density.

### Conclusions

During the research period three aphid species were found in oat variety Dunav 1 - *Sitobion avenae* (F.), *Schizaphis graminum* and *Rhopalosiphum padi* (L.).

Different climate conditions in the period of aphids' multiplication have significant influence on their population dynamic and species composition.

For the three years running the investigation, independently of the climate conditions and plant development, predominant in oat variety Dunav 1 is *Sitobion avenae*. Weather permitting and crop growth determined occurrence of the other species in insignificantly low density.

### Referances

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