

## OCCURRENCE OF APHIDS (*APHIDIDAE*) AND LADYBIRDS (*COCCINELLIDAE*) ON WINTER WHEAT

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**Abstract.** In the years 1995-1997, studies were carried out on the occurrence of aphids and ladybirds on winter wheat in the south-eastern Poland. Depending on the atmospheric conditions the first aphids on wheat plantations were found from decade II of May. The peak of their mass occurrence was recorded in decads II and III of June. The first overwintering beetles ladybirds began their flight over the plantations from decade III of April till decade II of May. The peak of a mass occurrence of these beetles was noted in decades II and III of May. In all the localities and years of the studies the peak of a mass occurrence of beetles of ladybirds always preceded the mass occurrence of aphids on winter wheat.

**Key words:** ladybirds, aphids, winter wheat, occurrence

### I. INTRODUCTION

The useful role ladybirds in field crops, including cereal plantations, which consists in limitation of the intensity of aphids as one of the most dangerous group of plant pests, has long been known and appreciated. In recent years, cereals have been involved in a more and more widespread chemical protection from diseases and pests. Knowledge of the time of these insects occurrence and the course of their development on wheat and other cereal crop plantations makes it possible to plan and apply chemical treatments in such a way, as to prevent population mortality of these aphidophages. Recently, comparatively many studies concerning predatory beetles from the families *Coccinellidae* and *Aphididae* as well as studies concerning interrelations of these pests on plants have been published (Bielawski 1959; Gałęcka 1969; Lewińska and Kaczorowski 1998; Pruszyński and Korcz 1981; Pruszyński and Lipa 1970; Ruskowski 1962; Żurańska and Ciepiewska 1983).

The aim of the conducted studies was to determine the time occurrence and the course of development of ladybirds and aphids on wheat plantations in the south-eastern Poland region.

### II. MATERIALS AND METHODS

The studies were carried out in 1995-1997 in the region of south-eastern Poland in the localities: Bażanówka, Boguchwała and Krzeczowice. Analyses performed during these

studies covered plantations of winter wheat, where no control treatments against diseases and pests were applied. In the period from April to August, observations on the course of pest and aphidophage development were systematically conducted once a week. Plant analyses and insect catchings with a normal entomological net were used during these studies. Catchings were performed in the afternoon hours, when the weather was windless. One sample consisted of 100 net sweeps, i.e. four captures, each containing 25 sweep nettings done diagonally across the field. The collected material was transferred into foil bags, after which the captured insects were identified in a laboratory and described using available identification key.

Wheat analyses for aphid occurrence were also performed once a week using above-ground parts of plants, i.e. stems, leaves and spikes. The analysis of 100 stems (in 4 points, each having 25 stems) was done each time to work out the dynamics of aphid occurrence during spring vegetation.

### III. RESULTS AND DISCUSSION

Meteorological conditions during the growth seasons, when they had the largest influence on the state of cereal crop health in 1995-1997, are presented in Fig. 1.

In 1995, there occurred an excess of rainfalls in the early spring (in April). Later, until August, the total amount of rainfalls as well as temperatures were similar to the means of many years. In 1996-1997, the beginning of the spring was relatively cold, as a result of which there occurred more than a 2-week delay of plant vegetation. By the end of the cereal crop vegetation season, particularly by late June and in July, an excess of rainfalls was noted in the both years.

In 1995, the first beetles of ladybirds were captured in Boguchwała on May 4. Their maximum occurrence was recorded on June 22 in Bażanówka as well as on May 26 in Boguchwała and on May 31 in Krzczowice. The last specimens of agrophages were found on the plantation in Krzczowice on June, in Boguchwała – on June 20, and in Bażanówka – on July 6 (Fig. 2).

In 1996, the first beetles of ladybirds were found in Krzczowice and Boguchwała on May 7, and on May 16 in Bażanówka. Their maximum numbers were on May 21 in Boguchwała, in Bażanówka – on May 22, and on May 23 in Krzczowice. They were found on plants until June 11 in Krzczowice, but until June 6 in Boguchwała and until May 29 in Bażanówka (Fig. 3).

In 1997, the first appearance of that group of insects occurred on May 8 in Krzczowice, on May 13 in Bażanówka and on May 14 in Boguchwała. They reached their maximum numbers on May 21 in Boguchwała, on May 27 in Bażanówka and on June 5 in Krzczowice (Fig. 4).

The largest numbers of ladybirds were captured in 1997, less – in 1995 and the least number – in 1996. These useful insects were comparatively numerous in Bażanówka and Krzczowice, whereas in Boguchwała their numbers were somewhat smaller. The most numerous species on wheat was *Coccinella septempunctata* (L.).

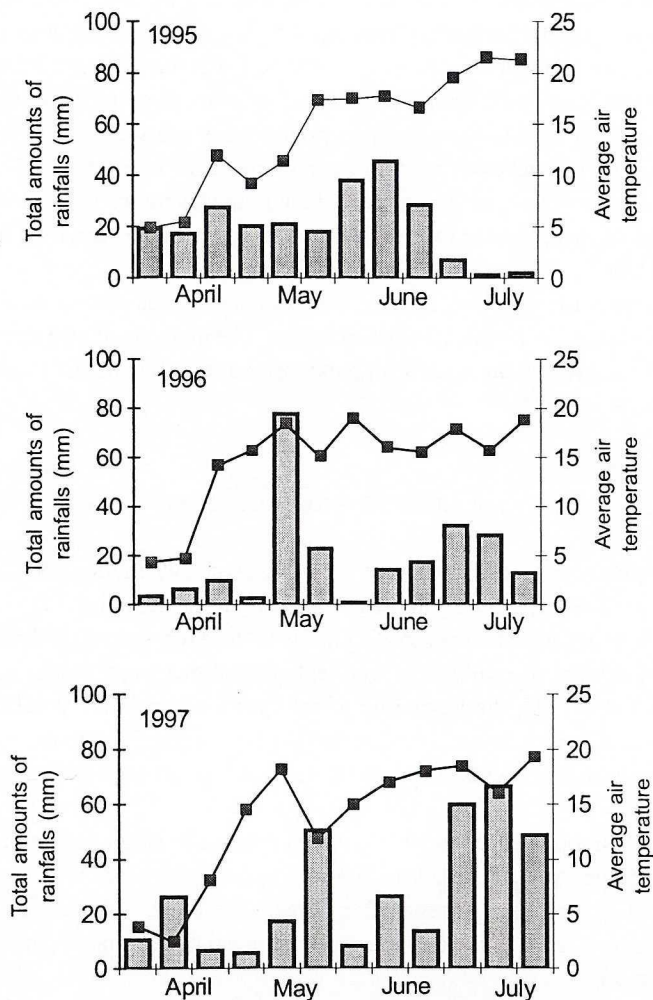


Fig. 1. Average decade air temperature and decade total amounts of rainfalls in the months: April-July 1995-1997

Many authors have performed studies on dates of *Coccinella* insect occurrence. Ruszkowski (1962) conducted observations on the occurrence of coccinellas on various crop plants as well as on dicotyledonous trees and shrubs. This author found *Adonia variegata* (Goeze) to occur on wheat ears *P. 14-punctata* (L.) – on barley. Bielawski (1959) reports that the earliest species of ladybirds appearing in spring are *Coccinella septempunctata* L., *Adalia bipunctata* L. and *Adonia variegata* (Goeze). Studies of Żurańska and Ciepielska (1983) carried out in the vicinities of Olsztyn and Kętrzyn on the occurrence of ladybirds on crop plants, such as cereals, stable greenlands, perennial legumes and potatoes showed that the largest number of these insects was found to occur on potatoes 8 species and the least

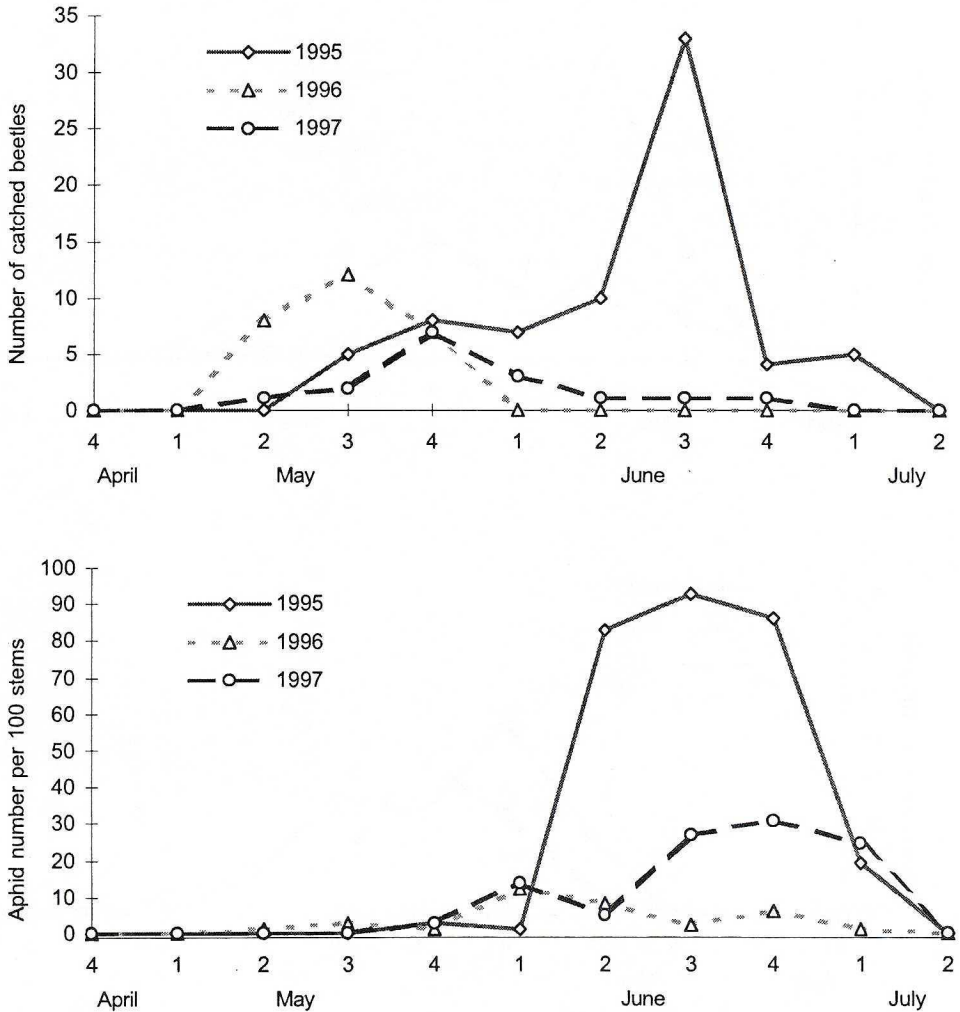


Fig. 2. The dynamics of ladybirds and aphids occurrence on winter wheat in Bażanówka

number – on cereals 3 species: *Tythaspis sedecimpunctata* L., *Coccinella quatordecimpustulata* L. and *Propylea quatordecimpunctata* L.

In 1995, the first appearance of aphids was noted on a wheat plantation in Krzeczowice and in Boguchwała on May 26, whereas in Bażanówka – on June 1. The maximum number of these pests was found on June 22 in Bażanówka, on June 13 in Krzeczowice and on May 31 in Boguchwała. The last aphids were observed on plants on July 6 in Bażanówka, on June 21 in Krzeczowice and June 20 in Boguchwała.

In 1996 the first aphids occurred in Bażanówka on May 16, in Boguchwała on May 21, in Krzeczowice on May 23. Their maximum numbers were recorded in Boguchwała on



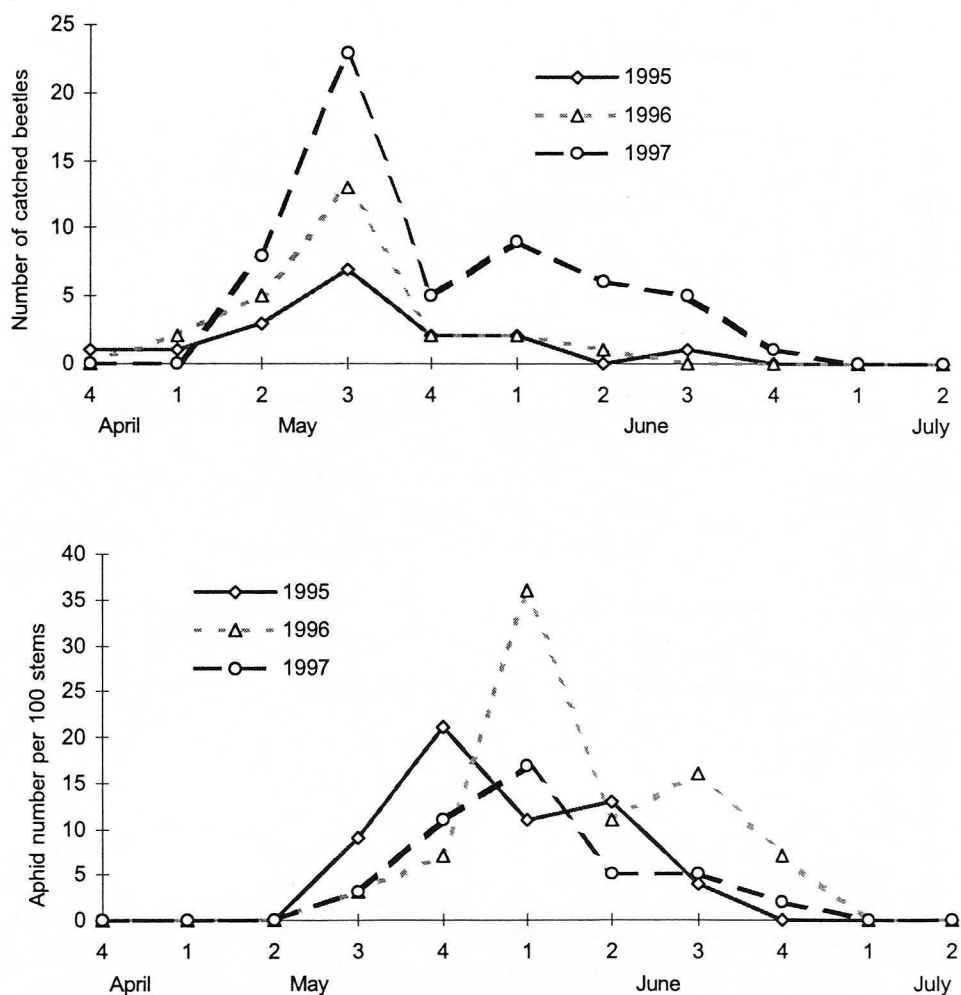


Fig. 3. The dynamics of ladybirds and aphids occurrence on winter wheat in Boguchwała

May 31, in Krzczowice on May 30 and in Bażanówka on June 4. The last aphids were found in Bażanówka on July 2, in Boguchwała on June 24 and in Krzczowice on June 19.

In 1997, the first appearance of aphids was noted on May 21 in Boguchwała, on May 27 in Bażanówka and on May 29 in Krzczowice. Maximum numbers of these pests were found on June 20 in Krzczowice, on June 25 in Bażanówka and on June 3 in Boguchwała. They were present on plants the longest in Bażanówka – until July 2, but until June 27 in Krzczowice and until June 23 in Boguchwała.

Specimens of that group of insects were found in the largest numbers on the plantations in Bażanówka, in average numbers in Krzczowice and in the smallest numbers in

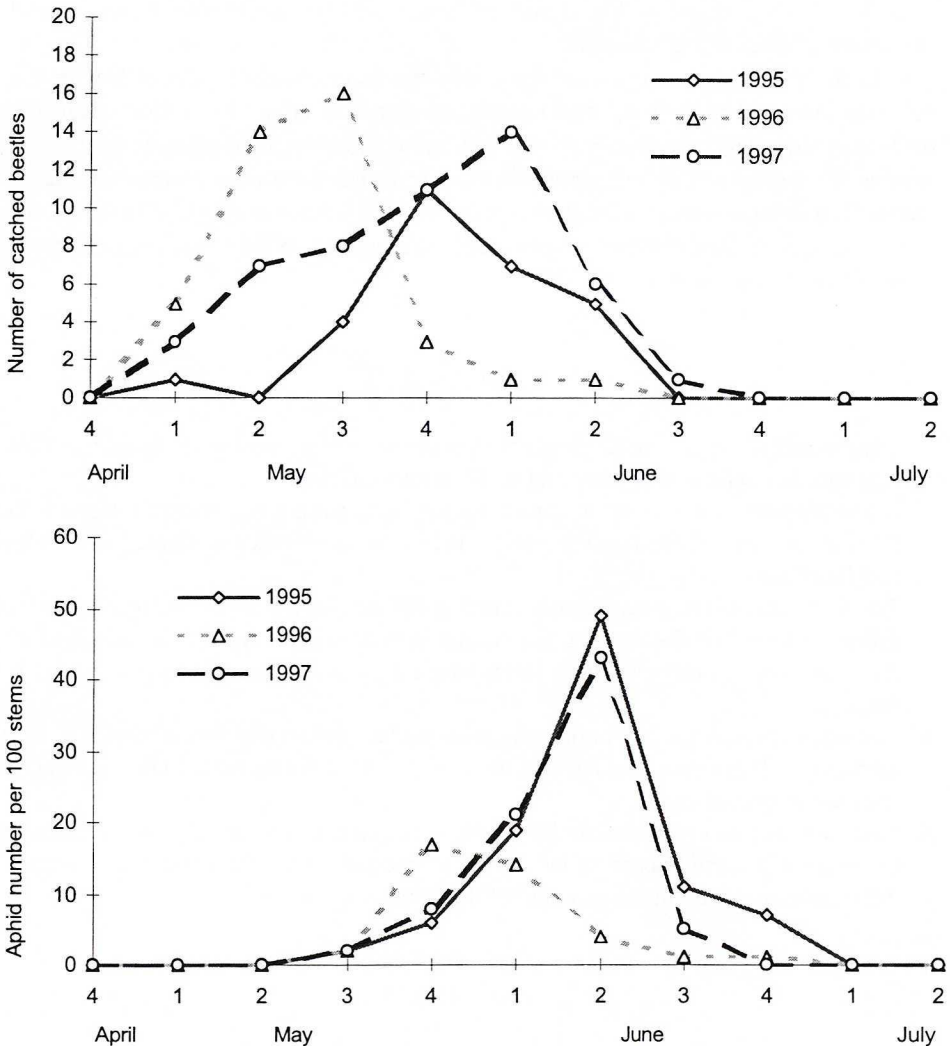


Fig. 4. The dynamics of ladybirds and aphids occurrence on winter wheat in Krzczowice

Boguchwała. Aphid species occurring most numerously on wheat were: *Rhopalosiphum padi* (L.) and *Sitobion avenae* (F.).

According to Ruszkowska (1987) over 40 aphid species were found on cereals and grasses, whereas two of them – *Rhopalosiphum padi* L. and *Sitobion avenae* F. were distinguishing by a mass occurrence. Kaniuczak and Lisowicz (1992) carrying out studies on aphid occurrence in Krzczowice near Przeworsk found that the intensity of these insects on winter wheat in south-eastern Poland is characterized by large variability in particular years, depending on their stock in the environment, the course of meteorological conditions and also on the presence of aphidophages. Maximum population numbers in these studies

were found in the second or third decade of June, i.e. by the end of plant flowering and in the period of grain filling of wheat.

In all the localities and years of the studies the occurrence of beetles of ladybirds as a rule was preceded by the most numerous occurrence of aphids on winter wheat. Ladybirds as aphidophages are closely related with aphid numbers. In the years of the conducted studies the numbers of aphids were relatively low and, therefore, the nutrition base for ladybirds was modest and the number of these useful beetles was also low. In the localities under study, no marked differences appeared in the numbers of lady bugs and aphids on the plantations of winter wheat.

#### IV. CONCLUSIONS

1. The intensity of aphid and ladybirds occurrence on winter wheat in south-eastern Poland was variable in particular years and in different localities.
2. Depending on the atmospheric conditions the first aphids were found on wheat plantations from decade II of May. The peak of their mass occurrence was noted in decades II and III of June.
3. The first overwintering beetles in that part of Poland, depending on meteorological conditions, began their flights over plantations from decade III April to decade II of May. An exception was Bażanówka in 1995, where their maximum occurred in decade II of June.
4. The occurrence of the ladybirds imago on wheat showed that they occurred most numerous in Bażanówka and Krzeczowice, whereas their occurrence in Boguchwała was somewhat less numerous.
5. In the years of the conducted studies, aphids occurred in comparatively low numbers and, therefore, the nutrition base for ladybirds was modest, and in this connection no marked differences appeared in the numbers of these insects.

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## WYSTĘPOWANIE MSZYC (*APHIDIDAE*) I BIEDRONEK (*COCCINELLIDAE*) NA PSZENICY OZIMEJ

### STRESZCZENIE

W latach 1995-1997 wykonano badania nad występowaniem mszyc i biedronek na pszenicy ozimej w rejonie Polski południowo-wschodniej. W zależności od przebiegu warunków atmosferycznych, pierwsze mszyce stwierdzano na plantacjach pszenicy od II dekady maja. Masowy szczyt występowania notowano w II i III dekadzie czerwca.

Pierwsze zimujące chrząszcze biedronek nalatywały na plantacje od III dekady kwietnia do II dekady maja. Masowy szczyt występowania tych owadów odnotowano w II i III dekadzie maja. We wszystkich miejscowościach i latach badań masowy szczyt występowania chrząszczy biedronek zawsze wyprzedzał masowe występowanie mszyc na pszenicy ozimej.