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Bionomy of *Myzus cerasi* (F.) on cherries and sweet cherries attached to a homestead gardens in the Mazowsze region

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Introduction

Cherry aphid is a species that comprises a large number of subspecies and races, the morphological differences between which are slight; what really differentiates them is their life cycles (SZELEGIEWICZ, 1968). *Prunus cerasus* and *Prunus avium* as well as *Cerasus fruticosa* and *Prunus cerasifera* are their primary hosts. PALMER (1952) collected these aphids from *Prunus domestica*, while TASZEW (1957) from *Prunus mahaleb*. In Japan (BLACKMAN & EASTOP, 2000) it was recorded on *Prunus mume* and it seems that it migrates to *Artemisa capillaries*. This form was named *Myzus cerasi ulmefoliae*.

The representatives of three families are its secondary hosts (BODENHEIMER & SWIRSKI, 1957; COTTIER, 1953; CICHOCKA, 1980): *Scrofulariaceae Veronica* (*baccabunga*, *teucrina*, *longifolia*, *chamaedryse*) and *Euprhasia* sp., *Rubiaceae Galium* (*aparine* and *mollugo*), *Asperula* sp., *Cruciferae Lepidium* sp. It is very likely that the list of hosts is longer.

The paper provides the results of observation of the bionomy of cherry aphid and sweet aphid in attached to a homestead gardens around the city of Warsaw, where trees had never been treated with pesticides. The secondary host, *Galium aparine* was also observed to occur among decorative plants in these gardens. The usefulness of *Galium aparine* as a secondary host for this aphid was proven by POKROWSKI (1932), who transferred migrants from cherries onto *Galium aparine*. Research observations were carried out in 1965

and 1966 and then they were repeated in 1986 and 1987, and in 2006 and 2007.

Material and methods

Eggs were sought for on the bark of shoots, branches, and trunks of cherry and sweet cherry trees in both, winter and spring. The discovered eggs were marked with labels. On a part of the eggs isolators from bolting-cloth were put and the remaining part was left uncovered. In spring the following were observed: the hatching of the stem mothers (fundatrices) larvae, their (30 females) maturation period, mortality during development and fecundity. Then the development of the fundatrices' offspring (also 30 females of each generation) was observed in each year of the research in a similar way like in the case of fundatrices. The number of isolated and uncovered aphids was compared (the impact of natural enemies and atmospheric conditions). Attention was paid to the generation which produced winged females (migrantes) and the length of migration. Similar measures were taken during autumn on *Prunus* and in summer on the secondary host *Galium aparine*.

Results and discussion

Overwintering eggs were most often found on young shoots between a bud and a shoot, less often in scar left after the fallen leaves or bark cracks. Similar observations were registered by KARCZEWSKA (1962). BÖRNER & HEINZE (1957) state that the eggs of this aphid can also be found on bark of the thicker branches and the trunk. Around one bud from 1 to 11 eggs were recorded. Never were the eggs recorded on old branches or the trunk. Larvae hatching usually took about 2 weeks but may have been stopped when frost took place. Such a situation was observed in 2007 when temperature, which fell down to 11°C, halted larvae hatching and only after it was warmer was it continued.

Light brown fundatrices larvae soon after hatching moved towards bursting buds and located themselves on their top parts. As the buds gradually opened the larvae moved towards the inside. First moult took place inside the buds. The next moult occured after 2-4 days after the first one had taken place, and the two subsequent ones after 3-7 days. A complete development of the fundatrices ranged from 20 days (1965) up to 28 days (1966). In 2007 when after 87% of the eggs hatched there was one-day frost (-11°C) which caused all the larvae to die. The remaining larvae that hatched later were prey to *Coccinella septempunctata*, which was numerous in private gardens.

A tight dependency between the development of this aphid on the primary host and the tree phenology was observed. The hatching of the fundatrices larvae started at the time when buds of the sweet cherries started to swell. This usually took place in April (26th in 1965, 6th in 1966, 28th in 1985, 30th in 1986, 26th in 2006 and 17th in 2007).

The maturation of fundatrices was taking place for about 3 weeks and it coincided with the beginning of blossoming of the sweet cherry (16 May 1965, 28 April 1966, 20 May 1985, 23 May 1986, 26 May 2006 and 12 May 2007). The maturation of the first generation of fundatrigeniae coincided with the time of sweet cherry bloom finishing, which took place, depending on the research year, between 9th May (1966) and 4th June (1986).

The fertility of fundatrices on sweet cherry shoots, which were covered with isolators, was 54-141 larvae, 88.4 on average and on sour cherry 56-102 respectively, 72.1 on average. RAKAUSKAS (1984) states that on sour cherries around Vilnus the fertility of this aphid was 83-167 larvae per female. On uncovered shoots the number of larvae born by fundatrices was much lower. On sweet cherries 32-116, 68.3 on average, and on sour cherry 27-74, hence 46.7 larvae on average were registered. Thus as a result of natural predators activity as well as the impact of natural weather conditions such as rain and wind, about 22% of larvae died on sweet cherries and 35% on sour cherries. Daily fecundity decreased with the day of birth- giving and ranged from 7-14 in the first days, and from 1-4 in the last days.

The fundartigeniae larvae settled the topmost leaves, peduncles of flower and parts of calyx. First deformations of leaves were observed when first fundatrigeniae larvae appeared. Then ants were recorded in aphid colonies.

The first generation of fundartigeniae matured for 14-16 days, 15.4 on average on sweet cherry and 15-18, 16.9 on average on sour cherry. All the females of this generation were wingless. Similar observations were registered in Bulgaria by TASZEW (1957) and in Latvia by RUPAIS (1961). Their fertility was similar on both tree species and ranged from 17 to 36 larvae, 31.4 on average. The fertility of the second and third generations was on average 26.3 and 22.7 larvae/female respectively.

In the second generation, the migrants constituted about 75% of females and in the third generation 89%. A part of aphids remained on sweet and sour cherries but shortly they became prey to ladybirds, spiders and parasitoids. There was no record of this aphid development on sour and sweet cherries through the summer. TASZEW (1957) in Bulgaria observed aphids of this species on sweet cherries throughout the whole summer. RAKAUSKAS (1984) states that in Lithuania 12 generations of this aphid's fundatrices, 8-10 generations of fundatrigeniae and amphigonic females developed annually on sour cherries. Winged migrants were registered to appear there also from the second generation of fundatrigeniae.

In the studied attached to a homestead gardens the percentage of young growths deformed by *Myzus cerasi* on sweet cherries ranged from 51 in 1965 to 79 in 2006. In 2007 as a result of strong frost during the hatching of fundatrices and numerous appearances of 7-spot ladybirds, the studied sweet cherry trees were free from aphids in spring and summer. Only sparse autumnal generations appeared on these trees in September.

The migration from sweet cherries to sour cherries lasted, depending on the year of research, from the first days of June until 7th July.

First migrants on *Galium* were observed between 8th and 15th June, and sometimes appeared until mid-July. There, they gave birth to 2-5 larvae after which they died or flew away but from 7 to 12 embryos were found in their dead bodies.

Females of *Myzus cerasi* on *Galium* were significantly smaller than on *Prunus* and formed less numerous colonies (3-31 specimens) in leaf spathes, on their bottom part or on shoots. The highest number of generations on *Galium* was observed in 2006 (6 generations) when spring was early and warm and summer was hot. In the remaining years of research only 4-5 generations were observed. The fertility on *Galium* was low and ranged from 9 to 13 larvae per female. In each generation winged females were recorded. In 2007 in gardens few migrants flew on *Galium* and settled only few plants. After about 14 days it turned out that 95% of aphids were parasitized.

Winged re-migrants appeared in the second part of September and males in the second week of October. Re-migrants were registered on *Prunus* the earliest between 19th and 27th September (1965). Their flight lasted until the first frost, at times until mid-November. Females landed on the upper part of the leaves, then went on the bottom surface of the leaves and after a short feeding they started giving birth to oviparae larvae (3-6 specimens/ female) and usually died the following day. In their dead bodies no unborn larvae were found. The oviparous larvae went down to young twigs (to avoid falling off with a leaf). Their maturation lasted in both trees for 14-18 days, 16.4 days on average. Adult oviparae were registered since the second week of November, when winged males appeared. The oviparous females laid 1- 8 eggs each, usually next to the buds. A female that was laying eggs moved along the twig and rarely did it lay more than one egg in one place only.

In 1965 around the same time there was ground frost and snowfall which caused 47% of the oviparae to die. The autumn of 2006 was long and warm and the laying of eggs was observed through the whole November. On sweet cherries large numbers of eggs were recorded. However, in the spring of 2007 there was frost which took place after most fundatricae larvae had already hatched and thus caused high mortality. The forecasting which claimed that 2007 would be the year of high number of aphids on sweet cherries due to large numbers of overwintering eggs, did not come true.

During the many years of research it was observed that the sour cherry was a slightly worse host than the sweet cherry. Because sour cherries in the researched gardens were not treated with fungicides against fungal diseases from the 1980s, they started loosing their leaves in the end of August and, therefore, the re-emigrants could not have returned to these plants in the spring.

The role of ladybirds (especially *Coccinella septempunctata*) and spiders was also high in the early spring. It was much higher in the gardens than in the orchards. Warm and early spring and hot summer of 2006 as well as long and warm autumn provoked a much higher number of aphids on sweet cherries. This caused as much as 79% damage of new growths of branches and a laying of a large number of eggs in the autumn on sweet cherries. Meanwhile the development of a higher, than in previous years, number of generations was recorded on *Galium*.

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Bionomia *Myzus cerasi* (F.) na wiśniach i czereśniach w ogrodach przydomowych Mazowsza

Streszczenie

Praca zawiera dane dotyczące bionomii *Myzus cerasi* na czereśniach i wiśniach w ogrodach przydomowych Mazowsza. Na drzewach tych obserwowano rozwój fundatrices, 3 pokoleń fundatrigeniae a jesienią oviparae. Pierwsze pokolenie fundatrigeniae stanowiły bezskrzydłe samice a w następnych pojawiały się licznie migrantes, które przelatywały na rosnące w ogrodach *Galium aparine.* Na żywicielu wtórnym rozwijało się 4-6 pokoleń. Powrót na wiśnie i czereśnie rozpoczynał się w drugiej połowie września i trwał do pierwszych mrozów. Reemigrantki pobierały niewiele pokarmu z liści czereśni i rodziły larwy na liściach. Larwy oviparae schodziły na młode gałązki i tam dojrzewały. W momencie dojrzewania samic oviparae nalatywały z *Galium aparine* uskrzydlone samce. Po kopulacji samice składały do 8 jaj na pędach przy pączkach, w spękaniach kory lub w miejscach po opadłych liściach. Na liczebność mszyc w sezonie wegetacyjnym największy wpływ wywierały przymrozki w okresie wylęgania larw fundatrices, które potrafiły zniszczyć młode larwy. Duże znaczenie w redukcji liczebności tej mszycy w okresie wiosennym mają także biedronki (zwłaszcza *Coccinella septempunctata),* których liczebność w nie opryskiwanych ogrodach przydomowych jest wysoka.