

RAPID COMMUNICATION

Distribution of damages in Poland caused by the sugar beet weevil (*Asproparthenis punctiventris* Germ. Coleoptera: Curculionidae)

Zdzisław Klukowski^{1*}, Jacek Piszczek²¹ Department of Plant Protection, Wrocław University of Environmental and Life Sciences, Wrocław, Poland² Regional Experimental Station, Institute of Plant Protection – National Research Institute (IPP – NRI), Poznań, Poland

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*Corresponding address:
zdzislaw.klukowski@upwr.edu.plResponsible Editor:
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Abstract

Over the last decade, an expansion of sugar beet weevil has been observed in Poland, damaging seedlings of sugar beet plants. The distribution of damage caused by this species in Poland is presented. The expansion of the distribution of losses was illustrated on the UTM map in 2-year intervals.

Keywords: *Asproparthenis punctiventris*, *Bothynoderes punctiventris*, pest distribution, sugar beet, sugar beet weevil

During the last several years, rapid colonization of sugar beet crops in Poland by the sugar beet weevil (SBW) has been observed. The scope of damage and the progressive range of its expansion exclude the incidental character of its occurrence in the country.

The damage caused by this species is primarily due to overwintered beetles feeding on emerging sugar beet plants and, to a lesser extent, by larvae feeding on outer root surfaces. When beetles are present in large numbers, it results in the destruction of emergent plants and the need for re-seeding. Plants from the 6–8 leaf stage are able to compensate for moderately intense beetle feeding.

The aim of this report was to describe the recent expansion of a pest species in Poland in the context of progressing climate change and migratory expansion of this pest in neighboring countries.

In Europe, sugar beet weevils (SBW) periodically attack crops mainly in the south-eastern parts of the continent. The species has caused numerous damages to plantations in central-eastern and southern Ukraine and the Balkan Peninsula. Sporadically and with low intensity, there has also been damage in central Europe.

In the last two decades, the territory and intensity of damage to beet plantations has expanded westwards (e.g., to Austria since 2002), and its intensity has increased in Croatia and Hungary (Drmić *et al.* 2019).

In the past century, due to the species' high soil and thermal requirements, mass damage in the states north of Austria and Hungary was sporadic. Within central-eastern Europe, the border counties of southern Bohemia and Moravia were a permanent area of the cyclic occurrence of SBW. However, in northern Bohemia, closer to the Polish border, economically significant damage was reported much less frequently. Damage occurred in the plantations of the counties: Kutna Hora and Louny. However, in 1961–2005 they damage occurred only twice (Muška and Krejcar 2009). Earlier, in 1948–1949, the species simultaneously caused locally significant damage in the Czech Republic and Germany (Tielecke 1952; Auersch 1954). Farther north in Brandenburg, damage was done in the 1950s (Auersch 1961). However, these were damages only of local intensity.

The only SBW gradation in Poland at that time was recorded in the second half of the 1930s. The

structure of those curculionids assemblages surveyed in the spring of 1937 was described as: *Asproparthenis* (= *Bothynoderes*) *punctiventris* Germ, ca. 77%, *Cleonis pigra* Scop. (= *Cleonus piger* Scop.) – 14%, *Cleonus foveicollis* Sebl. – 4.5%, *Bothynoderes affinis* Schrank (= *Chromoderus fasciatus* Mull.) – 3%, *Cleonus tigrinus* Panz. – 0.5%. The study concerned a beetroot crop in the former Wołyń province (Kamiński 1937). The author proposed trapping SBW by using catching grooves. The presence of beetles parasitized by fungus *Metarhizium anisopliae* (Metsch.) (Clavicipitaceae) on half of the studied plantations was also confirmed. From the post-war period, there is no information in the Polish literature about significant damage caused by this weevil.

The SBW spread data are the result of our field monitoring and information from over 70 pheromone trap locations distributed throughout the country. In addition, verified reports from sugar factory inspectors were included.

Results

The first isolated case in this century in Poland was a single plantation destroyed by SBW near Stubno in 2006 (UTM – FA42). However, economically significant damage was only reported in 2014 and 2015 in southeastern Poland on numerous remote plantations. However, in most cases they did not require re-sowing.

Growers from the Hrubieszów area also confirmed that in earlier years (2013–2014) they observed economically insignificant damage to young plants. However, since 2016 significantly large damage has been observed both in the Hrubieszów (GB02, GB03) and Działoszyce (DA57, DA58) areas. In subsequent years, the territorial scope of damage caused by this species increased. Another massive cluster of SBW damage was seen near Sandomierz (EB43) and Szczepczeszyn (FB31). In 2018, numerous scattered but insignificant damages were found on crops near Opole, but no further crop emergence losses were found there in the following season. In 2019, a new distant cluster of sugar beet damage was recorded near Nacpolsk (DD41, DD51), about 260 km in a straight line from the nearest SBW area and in 2020 another cluster was seen near Kłodawa (CC68). The current distribution of damage in the country is shown in Figure 1.

An abundance of SBW in cultivated fields is consistently accompanied by a small (in total, no more than 3% of all beetles caught) admixture of species *Cleonis pigra* and *Bothynoderes affinis*. In the north of the country, we observed a significant change in interspecies proportions. In such species structures, the SBW which are dominant in the south of the country are usually rare or absent. Also, in 2019 and 2020, local damage to marginal sowing strips caused by the dominant *Bothynoderes affinis* with a few SBW was found near Gryfino (VU69, VU79, VV70). An analogous reversal proportion was found the following year in the Nacpolsk-Glinojeck area.

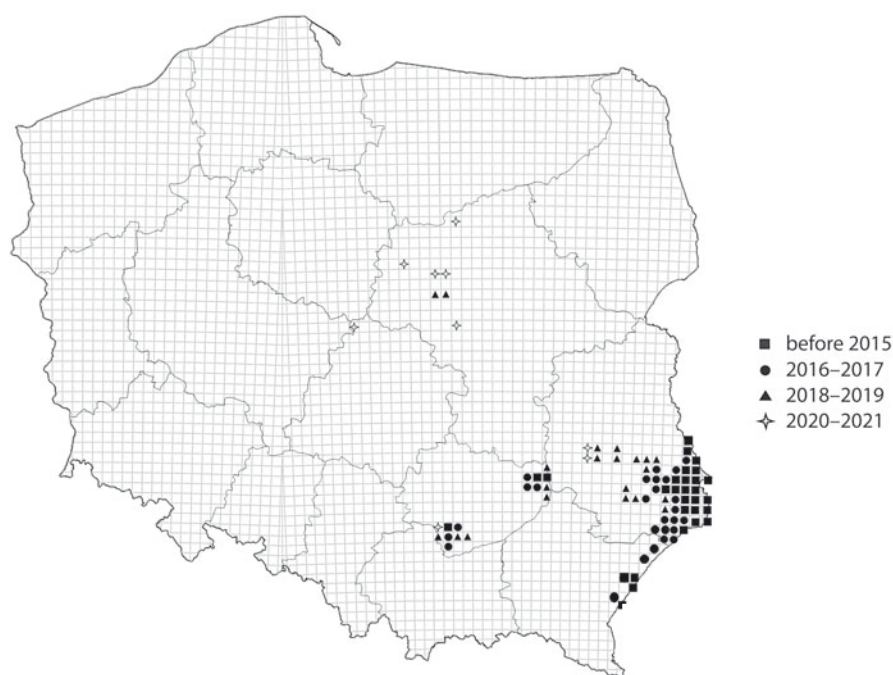


Fig. 1. Damage distribution of *Asproparthenis punctiventris* in Poland (UTM map, by G. Gierlański)

Discussion

The lack of significant damage to sugar beet crops for about 70 years was due to the fact that the Polish climate had significant fluctuations in substrate moisture and thermal deficits (especially in spring) which for decades was suboptimal for this species. However, since the 1980s, the number of hot and very hot spring days (>25.0°C) in the Lublin area has been steadily increasing (Dobek *et al.* 2010). Therefore, climatic conditions allowing for expansion have been created (Porter *et al.* 1991).

It is also very possible that such a sudden (within one season of 2019) occurrence of new damages at a considerable distance from the clusters in the existing growing areas (about 260 km), is the result of the transportation of semi-finished products and machinery between sugar factories.

It is worth pointing out, that SBW is a thermophilic species associated with chernozem and alluvial soils. It is also a halophile which has adapted to an increasing number of nitrophilous plants, mainly from the Amaranthaceae and Polygonaceae families. However, modern intensive agricultural production involves the use of relatively high doses of fertilizers which promote the abundance of uncultivated nitrophilous plants in the agricultural landscape and build the food base for the sugar beet weevil.

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