ISSN 0013-8738, Entomological Review, 2022, Vol. 102, No. 4, pp. 446–457. © Pleiades Publishing, Inc., 2022.
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New Data on the Insects (Orthoptera, Heteroptera, Coleoptera, Lepidoptera) Feeding on *Ambrosia artemisiifolia* L. (Asteraceae) in the South of the Russian Far East

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Received February 2, 2022; revised March 27, 2022; accepted March 27, 2022

Abstract—New information is provided on the insects (Orthoptera, Heteroptera, Coleoptera, Lepidoptera) collected from the common ragweed *Ambrosia artemisiifolia* L. in the south of the Russian Far East (Primorskii Territory), their trophic relationships, and damage caused to the plant. Observations in stationary cages mounted on ragweed plants have revealed the phytophagous species adapted to feeding and developing on this weed and damaging it: *Apolygus lucorum* (M.-D.) (development on ragweed from oviposition to adult), *Eurydema dominulus* (Scop.), *Graphosoma rubrolineatum* (Westw.), *Palomena viridissima* (Poda) (from the IV or V instar nymph to adult) (Heteroptera); *Chlorissa obliterata* (Walk.), *Ectropis excellens* (Butl.), *Phthonosema tendinosaria* (Brem.), *Mocis annetta* (Butl.), and *Helicoverpa armigera* (Hbn.) (from the last instar larva to pupa or adult) (Lepidoptera).

Keywords: Orthoptera, Heteroptera, Coleoptera, Lepidoptera, Russia, Primorskii Territory, *Ambrosia artemisiifolia*

DOI: 10.1134/S0013873822040030

The first focus of the common ragweed *Ambrosia artemisiifolia* L. (Asteraceae) in the Russian Far East was discovered in 1963 in Spasskii District of Primorskii Territory. At present, the plant can be found in Amur Province, Khabarovsk Territory, the Jewish Autonomous Region, and in the south of Sakhalin Island. It is widespread and dominant in ruderal communities in the western, central, and southern areas of Primorskii Territory (Kharkevich, 1992; Aistova et al., 2014; Esipenko, 2018, etc.).

The common ragweed is a serious weed and a seasonal allergen source. In order to reduce its numbers, three species of phytophagous insects were introduced to Primorskii Territory in 1985–1987: *Zygogramma suturalis* (F.), *Z. disrupta* (Rogers) (Coleoptera, Chrysomelidae), and *Acontia* (*Emmelia*) *candefacta* (Hbn.) (= *Tarachidia candefacta* Hbn.) (Lepidoptera, Noctuidae). Of these, only *Z. suturalis* has naturalized in several areas of the region (Kovalev and Medvedev, 1983; Kuznetsov and Esipenko, 1991; Esipenko, 1998; Kuznetsov and Storozhenko, 2010; Kovalev et al., 2013; Aistova et al., 2014; Aistova and Bezborodov, 2015; Esipenko, 2018, etc.).

Apart from studying the results of introduction of natural enemies, it would be very important to identify the native phytophages which have adapted to developing on the common ragweed. The phytophagous insects associated with *A. artemisiifolia* in the south of the Russian Far East have been studied by local entomologists from 1985–1990 to the present. Several species of leaf beetles (Chrysomelidae), such as *Neocrepidodera obscuritarsis* (Motsch.) and *Chrysolina aurichalcea* (Gebl. in Mann.), are known to feed on the ragweed (Aistova et al., 2014; Aistova and Bezborodov, 2015). With our participation, 10 species of polyphagous true bugs (Heteroptera) from 5 families were earlier found on the ragweed: *Adelphocoris triannulatus* (Stål) (Miridae), *Megalotomus junceus* (Scop.) (Alydidae), *Eurygaster testudinaria* (Geoffr.) (Scutelleridae), *Carpocoris purpureipennis* (De Geer), *Dolycoris baccarum* (L.), *Car-*

bula putoni (Jak.), *Menida violacea* Motsch. (Pentatomidae), *Coreus marginatus orientalis* (Kir.), *Homoeocerus dilatatus* Horv., and *Molipteryx fuliginosa* (Uhler) (Coreidae) (Aistova et al., 2019; Markova et al., 2019, 2020a, 2020b, 2021).

In this paper, we report new data on insects of the orders Orthoptera, Heteroptera, Coleoptera, and Lepidoptera which feed on the common ragweed in the south of the Russian Far East, and describe their damage to the plant.

MATERIALS AND METHODS

The study was carried out from May to October 2018–2021 at the field stations and during research trips in Ussuriisk Urban District of Primorskii Territory, aimed at obtaining new data on the interaction of *A. artemisiifolia* with the native insect fauna. The ragweed growing sites, such as the sides of dirt and forest roads, wastelands, agrocenoses, and forest habitats, were surveyed every ten days. The methods included visual observation, manual collection of insects, and photography. The trophic relationships were studied under natural conditions and in stationary cages (Markova et al., 2018).

Based on observations of the recent years, the presence of insects on the ragweed was evaluated as "occasional" if 1–5 adults (for Lepidoptera, late instar larvae) were found, and as "common" if at least 6 adult or immature individuals were found on a group of ragweed plants or if the insects colonized a group of plants located close together or within 0.5–1 m from each other, and if obvious signs of feeding and damage to the plant were detected. Altogether, over 270 insect specimens were collected or recorded during the studies.

The mere records of insects on the ragweed, as well as occasional feeding of adults, do not indicate that this weed is a regular host plant of a particular insect species. Therefore, to obtain complete information, we conducted observations of preimaginal development and adult feeding on the ragweed under natural conditions and in stationary cages.

The material is partly kept in the private collection of the first author and in the collections of the Zoological Institute of the Russian Academy of Sciences (ZIN, St. Petersburg) and the Zoological Museum of the Far Eastern Federal University (FEFU, Vladivostok).

The list of insect species collected and recorded by us for the first time on the common ragweed is given below. The species are named according to the systematic lists published by experts in the particular taxa (Storozhenko, 2004, 2011; Löbl and Smetana, 2010; Vinokurov et al., 2010; Fibiger et al., 2011; Holloway, 2011; Sinev, 2019). The recorded cases of feeding on the common ragweed and the preferred parts of the plant are described based on our observations.

RESULTS

An Annotated List of Insect Species Collected from the Common Ragweed

Order ORTHOPTERA

Family TETTIGONIIDAE

Tettigonia ussuriana Uvarov, 1939

Material. Ussuriisk Urban District, env. of Kamenushka, floodplain forest (poplar, elm, and ecotone), 16.VII, 28.VIII.2018, 2 adults; plant nursery (mesophytic meadow, monodominant ragweed community), 15.VII, 29.VIII.2018, 2 adults; 17.VIII.2019, 1 adult. Occasional.

Biology. Adults were recorded on shoots, leaf laminae, and spikes of ragweed during its flowering and fruiting stages.

A common species occurring at forest edges. A mixophagous, mostly carpophagous species, consuming unripe seeds. In Primorye, it is a minor pest of cereals (Mishchenko, 1972; Storozhenko, 1995, etc.).

Distribution. Russia: south of Amur Province and Khabarovsk Territory, Primorskii Territory. Northeast China, Korea, Japan.

Family GRYLLIDAE

Oecanthus longicauda Matsumura, 1904

Material. Ussuriisk Urban District, env. of Kamenushka, floodplain forest (poplar, elm, and ecotone), 16.VII–28.VIII.2018, 5 adults; side of forest road along Barsukovka River, 10–30.VIII.2021, 8 adults; plant nursery (mesophytic meadow, monodominant ragweed community), 15.VII, 29.VIII.2018, 2 adults; 17.VIII.2019, 1 adult. Common.

Fig. 1. Grasshoppers (Acrididae) feeding on fruit spikes of *Ambrosia artemisiifolia* L.: (*1*) *Ognevia longipennis* (Shir.); (*2*) *Shirakiacris shirakii* (Bol.).

Biology. Adults were recorded on spikes and leaves of ragweed during its flowering and fruiting stages.

The species is ubiquitous, commonly found in meadows. This is a mixophage with prevalence of plant diet. Nymphs and adults damage soybeans, sunflowers, vegetables, and fruit crops by gnawing on leaves and petals and consuming pollen. During oviposition, adults damage plant stems and may facilitate fungal infection (Mishchenko, 1957, 1972; Mashchenko, 1984; Storozhenko, 1995, etc.).

Another species of this genus, *Oe. pellucens* Scop., was recorded on *A. artemisiifolia* in Europe (Maceljski and Igrc, 1989; Neïlik and Tsitsyura, 2020).

Distribution. Russia: south of the Far East. China, Korea, Japan.

Family ACRIDIDAE

Ognevia longipennis (Shiraki, 1910)

Material. Ussuriisk Urban District, env. of Kamenushka, floodplain forest (poplar, elm, and ecotone), 16.VII–28.VIII.2018, 4 adults; plant nursery (mesophytic meadow, monodominant ragweed community), 15.VII, 29.VIII.2018, 3 adults; 17.VIII.2019, 3 adults. Common.

Biology. Adults were recorded on spikes of ragweed during its flowering and fruiting stages (Fig. 1).

A phytophagous species. Nymphs and adults significantly damage fruit and berry crops in some years (Mishchenko, 1972; Storozhenko, 1995, etc.).

Distribution. Russia: south of Siberia and the Far East. Kazakhstan, Mongolia, China, Korea, Japan.

Shirakiacris shirakii (Bolivar, 1914)

Material. Ussuriisk Urban District, env. of Kamenushka, floodplain forest (poplar, elm, and ecotone), 16–17.VII.2018, 4 adults; side of forest road along Barsukovka River, 10–30.VIII.2021, 6 adults; plant nursery (mesophytic meadow, monodominant ragweed community), 15.VII, 29.VIII.2018, 3 adults; 17–20.VIII.2019, 4 adults. Common.

Biology. Adults were recorded on spikes of ragweed during its flowering and fruiting stages (Fig. 1).

A phytophagous, ubiquitous species, commonly found in dry meadows.

Distribution. Russia: Primorskii Territory. East China, Korea, Japan, Vietnam.

Order HETEROPTERA

Family MIRIDAE

Apolygus lucorum (Meyer-Dür, 1843)

Material. Ussuriisk Urban District, env. of Kamenushka, floodplain forest (poplar, elm, and ecotone), 4–27.VII.2020, 4 adults; 6.VII–9.VIII.2020, 2 adults; side of forest road along Barsukovka River, 6.VII–9.VIII.2020, 2 adults; Kaimanovka, household plot, 5–19.VIII.2020, 5 adults; 28.VI–17.VII.2021, 4 adults, 8 nymphs of II–V instars. Common.

Biology. Nymphs and adults sucked the cell sap on the ragweed laminae during the budding, flowering, and fruiting stages. Feeding on *A. artemisiifolia* was confirmed by keeping the II–V instar nymphs in a stationary cage until the successful final molt.

A polyphagous species, recorded as a pest of a number of crops: cotton, tobacco, beets; in nature it develops on many herbaceous plants (Putshkov, 1972). It was collected from *Artemisia* sp. on Kunashir Island (Kerzhner, 1978, 1988). We found the species on *Vitis amurensis* Rupr. (Vitaceae) and *Rubus* sp. (Rosaceae) (Kanyukova et al., 2022, *in print*).

Distribution. A trans-Eurasian species distributed from Western Europe to Japan and introduced to North America.

Family PENTATOMIDAE

Eurydema dominulus (Scopoli, 1763)

Material. Ussuriisk Urban District, env. of Kamenushka, floodplain forest (poplar, elm, and ecotone), 9.VIII.2020, 2 adults, 4 nymphs of IV and V instars; 31.VIII.2021, 4 adults, 5 nymphs of V instar. Common.

Biology. Nymphs and adults sucked the cell sap on the ragweed laminae and spikes during the budding, flowering, and fruiting stages (Fig. 2, *1*, *2*). Feeding on *A. artemisiifolia* was confirmed by keeping the V instar nymphs in a stationary cage until the final molt.

Nymphs and adults are polyphagous; eggs are mostly laid on Brassicaceae, sometimes found on Apiaceae (Petrova, 1975). The species was recorded as a pest of crucifers (Mishchenko, 1957; Putshkov, 1972; Ammosov et al., 1980; Kanyukova, 1995).

Other species of this genus were recorded on *A. artemisiifolia* in Europe: *Eu. oleracea* (L.) with two subspecies and *Eu. ornata* (L.) (Maceljski and Igrc, 1989; Neïlik and Tsitsyura, 2020).

Distribution. A trans-Palaearctic species.

Palomena viridissima (Poda, 1761)

Material. Ussuriisk Urban District, env. of Kamenushka, floodplain forest (poplar, elm, and ecotone), 1.IX.2020, 5 adults. Occasional.

Biology. Adults sucked the cell sap on the ragweed laminae during its fruiting stage. Feeding on *A. artemisiifolia* was confirmed by keeping the V instar nymphs in a stationary cage until the final molt.

A polyphagous phytophage, recorded mainly from herbaceous plants in Siberia (Petrova, 1975). In Siberia and the south of the Far East, the species damages plants of the family Fabaceae (Mishchenko, 1957; Putshkov, 1972; Kanyukova, 1995).

Distribution. A trans-Palaearctic species.

Graphosoma rubrolineatum (Westwood, 1837)

Material. Ussuriisk Urban District, env. of Kamenushka, floodplain forest (poplar, elm, and ecotone), 16.VII.2018, 2 adults; plant nursery (mesophytic meadow, monodominant ragweed community), 15.VII, 29.VIII.2018, 2 adults, 1 nymph of V instar; 17–20.VIII.2019, 5 adults, 5 nymphs of V instar. Common.

Biology. Nymphs and adults consumed the cell sap on the young ragweed shoots and spikes during the budding, flowering, and fruiting stages (Fig. 2, *3*, *4*). Feeding on *A. artemisiifolia* was confirmed by keeping the V instar nymphs in a stationary cage until the successful final molt.

Fig. 2. Shield bugs (Pentatomidae) feeding on *Ambrosia artemisiifolia* L.: (*1*, *2*) *Eurydema dominulus* (Scop.); (*3*, *4*) *Graphosoma rubrolineatum* (Westw.).

A polyphagous species occurring on wild and cultivated plants; its main hosts belong to the family Apiaceae. The species damages cultivated Apiaceae in the Far East (Mishchenko, 1957; Putshkov, 1972; Kanyukova, 1995). In autumn in Siberia the bugs were found in the root part of wormwood and other weeds (Petrova, 1975).

Distribution. South of the Russian Far East. China, Korea, Japan.

Order COLEOPTERA

Family CHRYSOMELIDAE

Atrachya menetriesi (Faldermann, 1835)

Material. Ussuriisk Urban District, env. of Kamenushka, plant nursery (mesophytic meadow, monodominant ragweed community), 15.VII, 29.VIII.2018, 5 adults; Kaimanovka, household plot, 16–25.VII.2018, 28.VIII.2018, 7 adults. Common.

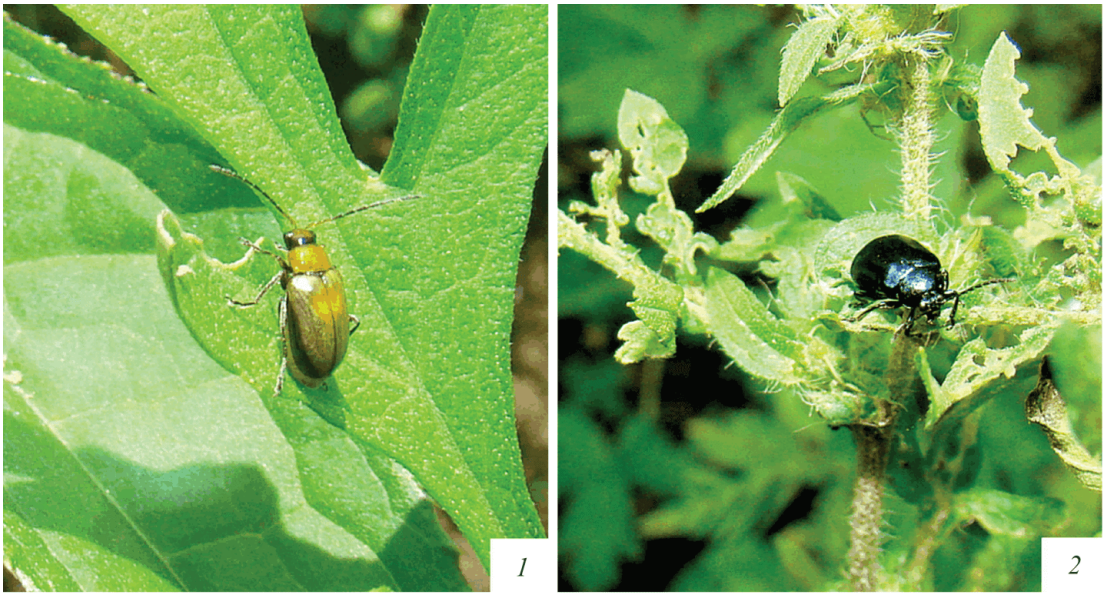

Fig. 3. Leaf beetles (Chrysomelidae) feeding on leaves of *Ambrosia artemisiifolia* L.: (*1*) *Atrachya menetriesi* (Fald.); (*2*) *Agelastica coerulea* Baly.

Biology. Adults were recorded on laminae of ragweed during its flowering and fruiting stages (Fig. 3, *1*). Feeding on *A. artemisiifolia* was confirmed by keeping the adults in a stationary cage for a month.

A broadly polyphagous species feeding on herbaceous plants; adults and especially larvae prefer plants of the family Fabaceae. It was listed as a pest of vegetable crops in the Far East (Medvedev, 1992). Adults were recorded on *Solanum muricatum* Ait. (Solanaceae) in Japan (Ishikawa and Takahata, 2019).

Distribution. Russia: Amur Province, Primorskii Territory, Sakhalin, South Kuril Islands. China, Korea, Japan.

Agelastica coerulea Baly, 1874

Material. Ussuriisk Urban District, env. of Kamenushka, plant nursery (mesophytic meadow, monodominant ragweed community), 29.VIII.2018, 8 adults. Common.

Biology. Adults were recorded on leaf laminae of ragweed during its flowering and fruiting stages (Fig. 3, *2*). Feeding on *A. artemisiifolia* was confirmed by keeping the adults in a stationary cage for a month.

Adults occur on *Alnus* sp., *Betula* sp., *Corylus* sp. (Betulaceae), and *Salix* sp. (Salicaceae). The species was listed as a pest of woody plants in the Far East (Medvedev, 1992).

Distribution. Russia: Amur Province, Primorskii and Kamchatka territories. China, Korea, Japan, introduced to North America.

Order LEPIDOPTERA

Family GEOMETRIDAE

Ectropis excellens (Butler, 1884)

Material. Ussuriisk Urban District, env. of Kamenushka, floodplain forest (poplar, elm, and ecotone), 16–21.VIII.2020, 2 last instar larvae; pupation 1.IX. 2020. Occasional.

Biology. Late instar larvae feed on ragweed leaves during the flowering and fruiting stages (Fig. 4, *1*). Feeding on *A. artemisiifolia* was confirmed by keeping the last instar larvae in a stationary cage until pupation.

A broadly polyphagous species, with larvae recorded on plants of the families Araliaceae and Apiaceae in Primorskii Territory and on plants of 18 families in

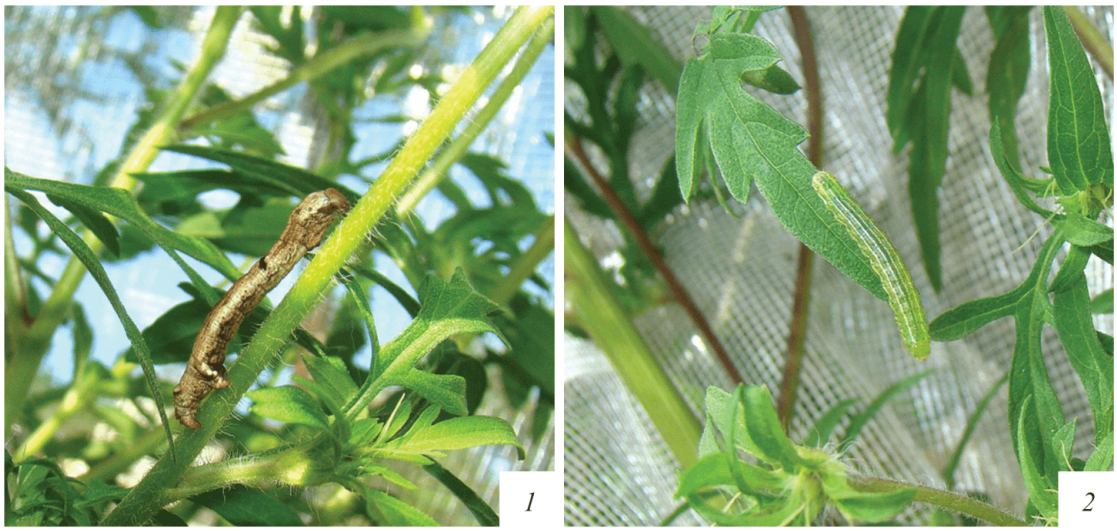

Fig. 4. Larvae of moths (Geometridae, Noctuidae) feeding on *Ambrosia artemisiifolia* L.: (*1*) *Ectropis excellens* (Butl.); (*2*) *Helicoverpa armigera* (Hbn.).

Japan (Belyaev, 2016). The species was not previously recorded on *A. artemisiifolia*. Larvae pupate in litter or soil.

Distribution. Russia: southeast of Amur Province, south of Khabarovsk Territory, Primorskii Territory, Sakhalin, Kuril Islands. China, Korea, Japan.

Phthonosema tendinosaria
(Bremer, 1864)

Material. Ussuriisk Urban District, env. of Kamenushka, floodplain forest (poplar, elm, and ecotone), 18–21.VIII.2020, 2 last instar larvae. Occasional.

Biology. Late instar larvae feed on ragweed leaves during the fruiting stage. Feeding on *A. artemisiifolia* was confirmed by keeping the last instar larvae in a stationary cage.

A polyphagous species, with larvae feeding on woody plants of the families Ulmaceae, Fagaceae, Betulaceae, Rosaceae, Fabaceae, and Oleaceae in Primorskii Territory, and on plants of 7 families in Japan (Belyaev, 2016). The species was not previously recorded on *A. artemisiifolia*.

Distribution. Russia: south of Amur Province, south of Khabarovsk Territory, Primorskii Territory, Kuril Islands. China, Korea, Japan.

Chlorissa obliterata (Walker, 1863)

Material. Ussuriisk Urban District, env. of Kamenushka, floodplain forest (poplar, elm, and ecotone), 5.IX.2020, 2 last instar larvae. Occasional.

Biology. Late instar larvae feed on ragweed leaves during the fruiting stage. Feeding on *A. artemisiifolia* was confirmed by keeping the last instar larvae in a stationary cage.

Larvae of *Ch. obliterata* were recorded on *Vicia cracca* L. (Fabaceae) and *Solidago virgaurea* L. (Asteraceae) in Japan (Belyaev, 2016). The species was not previously recorded on *A. artemisiifolia*.

Distribution. Russia: Amur Province, south of Khabarovsk Territory, Primorskii Territory, Sakhalin, Kuril Islands. China, Korea, Japan.

Eupithecia sp.

Material. Ussuriisk Urban District, env. of Kamenushka, floodplain forest (poplar, elm, and ecotone), 5.IX.2020, 2 last instar larvae. Occasional.

Biology. Late instar larvae feed on ragweed leaves during the fruiting stage. This was confirmed by keeping the last instar larvae in a stationary cage; however, since the larva died and no adult was reared, identification to species was impossible.

Larvae of the genus *Eupithecia* Curtis, 1825 typically feed on vegetative and generative parts of gymnosperms and dicots. Feeding of *Eupithecia* larvae on *Ambrosia* was not previously recorded in Eurasia. An American species of the same genus, *Eu. miserulata* Grote, 1863, is known to feed on ragweeds in North America (Matthews et al., 2014).

Superfamily NOCTUOIDEA

Family EREBIDAE

Mocis annetta (Butler, 1978)

Material. Ussuriisk Urban District, env. of Kamenushka, floodplain forest (poplar, elm, and ecotone), 19–21.VIII.2020, 4 last instar larvae; pupation on 2.IX.2020. Occasional.

Biology. Late instar larvae feed on ragweed leaves during the flowering and fruiting stages. Feeding on *A. artemisiifolia* was confirmed by keeping the last instar larvae in a stationary cage until pupation.

An oligophagous species, with larvae feeding on Fabaceae in Korea (Park et al., 2006; Matov and Kononenko, 2012). The species was not previously recorded on *A. artemisiifolia*. The larvae live openly on the leaves of the host plant (Matov and Kononenko, 2012, etc.).

Distribution. Russia: south of the Russian Far East. East China, Korea, Japan, India.

Family NOCTUIDAE

Helicoverpa armigera (Hübner, 1808)

Material. Ussuriisk Urban District, env. of Kamenushka, floodplain forest (poplar, elm, and ecotone), 17–21.VIII.2020, 5 last instar larvae. Occasional.

Biology. Late instar larvae feed on ragweed leaves during the flowering and fruiting stages (Fig. 4, *2*). Feeding on *A. artemisiifolia* was confirmed by keeping the last instar larvae in a stationary cage until successful pupation (1.IX.2020) and adult emergence (26.IX.2020). The pupal development lasted 26 days.

A broadly polyphagous species. The openly living, antho- and carpophagous larvae were recorded on plants from 51 families, mostly herbaceous ones. In particular, they were recorded on 33 species of Asteraceae, including *Artemisia camphorata* Vill. (Matov and Kononenko, 2012, etc.). Feeding on *A. artemisiifolia* was observed in Eastern Europe and in the south of European Russia (Esipenko, 2018; Neïlik and Tsitsyura, 2020).

Distribution. Russia: center and south of European Russia (introduced or migrant in other regions), North Caucasus, South Urals, south of West Siberia, Transbaikalia, and Russian Far East.

Collections from ragweed also contained larvae of sawflies, but this material was not further processed due to the difficulty of identification.

CONCLUSIONS

Altogether, we found 16 species of insects on the common ragweed. They belonged to 9 families of 4 orders: Orthoptera: Tettigoniidae (*Tettigonia ussuriana*), Gryllidae (*Oecanthus longicauda*), Acrididae (*Ognevia longipennis*, *Shirakiacris shirakii*); Heteroptera: Miridae (*Apolygus lucorum*), Pentatomidae (*Eurydema dominulus*, *Graphosoma rubrolineatum*, *Palomena viridissima*); Coleoptera: Chrysomelidae (*Agelastica coerulea*, *Atrachya menetriesi*); Lepidoptera: Geometridae (*Chlorissa obliterata*, *Ectropis excellens*, *Phthonosema tendinosaria*, *Eupithecia* sp.), Erebidae (*Mocis annetta*), Noctuidae (*Helicoverpa armigera*).

The above species are recorded for the first time on *A. artemisiifolia* in the south of the Russian Far East. Only the noctuid moth *Helicoverpa armigera* was previously known to feed on the ragweed in Eastern Europe and the south of European Russia.

According to our observations, immature or adult stages of *Oecanthus longicauda*, *Ognevia longipennis*, *Shirakiacris shirakii*, *Apolygus lucorum*, *Eurydema dominulus*, *Graphosoma rubrolineatum*, *Agelastica coerulea*, and *Atrachya menetriesi* commonly occurred on the ragweed. Most of the recorded phytophages prefer plants of the families Fabaceae, Apiaceae, and Asteraceae, while *A. lucorum*, *G. rubrolineatum*, and *H. armigera* are known to feed on *Artemisia* sp. The following 12 species are polyphagous phytophages (the pests of some field and fruit crops in Siberia and the Russian Far East are marked with an asterisk): **Ognevia longipennis*, *Shirakiacris shirakii*; **Agelastica coerulea*, **Atrachya menetriesi* (nibbling the leaf laminae of ragweed); **Apolygus lucorum*, **Eurydema dominulus*, **Graphosoma rubrolineatum*, **Palomena viridissima* (feeding

Fig. 5. Damage to *Ambrosia artemisiifolia* L. caused by feeding insects: (*1*) puncture marks left by bugs on the leaf laminae; (*2*) drying of leaves; (*3*) some parts and fragments of leaf laminae gnawed out by moth larvae; (*4*) apical withering of the shoot and impaired development of the flower spikes.

on the cell sap of young shoots, leaf laminae, and spikes of ragweed); *Chlorissa obliterata, Ectropis excellens*, *Phthonosema tendinosaria*, *Helicoverpa armigera* (nibbling the leaf laminae, florets, and fruits of ragweed). *Mocis annetta* is an oligophagous herbivore (nibbling the leaf laminae of ragweed); the tree cricket **Oecanthus longicauda* is a mixophage with prevalence of plant diet (nibbling the leaf laminae and petals, consuming pollen), and the bush cricket **Tettigonia ussuriana* is a mixophage with prevalence of carpophagy (consuming unripe seeds).

The severity of damage to *A. artemisiifolia* depends on the duration of feeding and the degree of infestation of the plant by insects, which use both vegetative and generative organs. We have identified the phytophagous insects adapted to feeding and developing on *A. artemisiifolia* and clearly damaging this weed. Feeding on the ragweed was confirmed by observations in a stationary cage for the following species: *Apolygus lucorum* (from oviposition to final molt); *Eurydema dominulus*, *Graphosoma rubrolineatum*, *Palomena viridissima* (from late instar nymphs to final molt); *Chlorissa obliterata*,

Ectropis excellens, *Phthonosema tendinosaria*, *Mocis annetta*, *Helicoverpa armigera* (from the last instar larvae to pupation or emergence of adults).

Some specific damage to ragweed caused by feeding of different insects can be noted. Nymphs and adults of true bugs (Heteroptera) suck the cell sap and leave puncture marks on the leaf veins. As the result of prolonged feeding, the damaged areas fall out while the apical parts of shoots, leaf laminae, and flower spikes wither and dry out. Short periods of feeding leave only puncture marks on the leaf veins.

Injuries caused by immature and adult stages of chewing insects (Orthoptera, Coleoptera, Lepidoptera) vary from local damage to gnawing out of some areas and falling out of fragments (Fig. 5).

At high levels of infestation, phytophages disturb normal development of the vegetative and generative parts of ragweed plants, including seeds (Fig. 5).

The insect species recorded in our study have different types of geographic distribution. Four species have wide ranges: *Helicoverpa armigera* is a cosmopolitan species, *Eurydema dominulus* and *Palomena viridissima* are trans-Palaearctic, and *Apolygus lucorum* is a trans-Eurasian species distributed from Western Europe to Japan and introduced to North America. Ten species have East Asian and Southeast Asian ranges extending beyond the Palaearctic into the Oriental Region. One species belongs to the group of Asian species inhabiting the south of Siberia and the Russian Far East, as well as Japan.

Thus, spreading of the common ragweed in the south of the Russian Far East (Primorskii Territory) is accompanied by expansion of the range of phytophagous insects capable of feeding on this plant and establishment of trophic associations between the native insect fauna and the invasive plant species.

Considering the literature data, 28 reliably identified insect species feeding on *A. artemisiifolia* are known in the study region. They belong to 12 families of 4 orders: Orthoptera (Tettigoniidae, Gryllidae, Acrididae), Heteroptera (Miridae, Alydidae, Scutelleridae, Pentatomidae, Coreidae); Coleoptera (Chrysomelidae), Lepidoptera (Geometridae, Erebidae, Noctuidae).

The reported data are preliminary and can be supplemented by further monitoring of common ragweed as a potential host plant for different taxa of insect phytophages in the study region.

ACKNOWLEDGMENTS

We are sincerely grateful to B.A. Korotyaev, A.Yu. Matov, V.G. Mironov (Zoological Institute of the Russian Academy of Sciences, St. Petersburg), F.V. Konstantinov (St. Petersburg State University and Zoological Institute of the Russian Academy of Sciences, St. Petersburg), E.V. Kanyukova (Zoological Museum of Far Eastern Federal University, Vladivostok), S.Yu. Storozhenko, E.A. Belyaev (Federal Scientific Center of the East Asia Terrestrial Biodiversity, Far Eastern Branch of RAS), and S.N. Ivanov (Vladivostok) for valuable advice during preparation of this paper.

COMPLIANCE WITH ETHICAL STANDARDS

Conflict of interest. The authors declare that they have no conflict of interest.

Statement on the welfare of animals. All the applicable international, national, and/or institutional guidelines for the care and use of animals were followed. All the procedures performed in studies involving animals were in accordance with the ethical standards of the institution or practice at which the studies were conducted.

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