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Leaf-footed bugs (Heteroptera, Coreidae) damaging red raspberry in the south of Primorsky Krai

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Abstract. In the recent decade, adults and nymphal instars of two leaf-footed bug species, *Coreus marginatus orientalis* Kir. and *Molipteryx fuliginosa* Uhl., have regularly been recorded from red raspberry (*Rubus idaeus* L.), dewberry (*R. caesius* L.), and their remontant varieties in agrocenoses in the south of Primorsky Krai. The leaf-footed bug infestation of these plants causes significant damage to berry crops. The reported study summarizes the observations conducted in 2020–2021. It provides a list of identified food plants of these insects, comparative features of the ontogeny of the two species under study, and distinctive features of adults and nymphs at different stages of ontogeny. The article also gives some practical recommendations on how to control leaf-footed bugs including the timing of measures.

Keywords: Heteroptera, Coreidae, Russian Far East, Primorsky Krai, *Coreus marginatus orientalis*, *Molipteryx fuliginosa*

Клопы (Heteroptera, Coreidae), вредящие малине, на юге Приморского края

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Аннотация. В последнее десятилетие имаго и личинки двух клопов *Coreus marginatus orientalis* Kir., и *Molipteryx fuliginosa* Uhl. регулярно встречаются в агроценозах юга Приморского края на малине обыкновенной — *Rubus idaeus* L., ежевике сизой — *R. caesius* L. и их ремонтантных сортах, нанося урон урожаю ягод. Авторами обобщены наблюдения 2020–2021 гг., приводится список выявленных кормовых растений этих насекомых, сравнительные особенности онтогенеза двух видов, даются отличительные признаки имаго и личинок на разных стадиях развития. Предлагаются практические рекомендации с указанием сроков борьбы с клопами.

Ключевые слова: Heteroptera, Coreidae, Дальний Восток России, Приморский край, *Coreus marginatus orientalis*, *Molipteryx fuliginosa*

Introduction

Leaf-footed bugs Coreidae Leach, 1815, one of the most extensive families of herbivorous bugs in the world's insect fauna, is represented in the Russian Far East by seven genera with a total of seven species. They belong to two subfamilies: Coreinae Leach, 1815 with four species, and Pseudophloeinae Stål, 1868 with three species (Vinokurov et al. 2010). Two Coreinae species — *Coreus marginatus* (Linnaeus, 1758) from the tribe Coreini Leach, 1815, represented in the east of the country by the subspecies *Coreus marginatus orientalis* (Kiritshenko, 1916), and *Molipteryx fuliginosa* (Uhler, 1860) from the tribe Mictini Amyot et Serville, 1843 — are distinguished by the largest body sizes. Both species are the only representatives of their genera in the Russian insect fauna.

The trans-Palearctic leaf-footed bug *C. marginatus* is one of the common species of the insect fauna throughout Russia's territory except in the north, while its eastern subspecies frequently occurs in the south of the Far East. By the mode of nutrition, *C. m. marginatus* is attributed to a group of omnivorous potential pests. It feeds on young vegetative and generative parts of plants in spring, and, subsequently, on ripening fruit and seeds, which can cause damage to cultivated sorrel and rhubarb (Putshkov 1972). However, the southeastern *C. m. orientalis* is not listed as a pest insect (Mishchenko 1957; Kanyukova 1995). In China, it is included in the book of economically significant insects (Zhang 1985), but is not considered a primary pest, since its host plants are weeds (*Filipendula palmata* (Pall.) Maxim., *Agrimonia* sp.). It is not included in the field guide to Japanese bugs (Tomokuni et al. 1993), which also indicates that the species are not that harmful in Japan.

M. fuliginosa was recorded from the Russian Far East more than three decades ago (Kerzhner, Kanyukova 1998; Kanyukova, Vinokurov 2009). In recent years, *M. fuliginosa* has expanded its range and been categorized as harmful to garden plants. Outbreaks of the bug population in a number of districts of Primorsky Krai were observed in 2012 and 2015, then the bugs of this species were reported to feed on *Rubus* sp. plants (Kanyukova 2012; Markova et al. 2016). This necessitates paying closer attention to the species, including putting it on the list of invasive insects (Markova et al. 2021a).

We have studied the life cycle of *M. fuliginosa* in the conditions of the south of Primorsky Krai, described the morphology of eggs and nymphal instars up to the first flight of new-generation adults, provided data on the duration of development for each instar stage, growth dynamics, and morphometric characteristics of pre-adult phases. We have also investigated phenology and breeding behavior of *M. fuliginosa*, described the female behavior, oviposition stages and fecundity of females (Markova et al. 2017a; 2017b; 2021b; 2022). The ecology of the Far Eastern subspecies, *C. m. orientalis*, and the parasitic flies identified on it were the focus of another work published by the authors (Markova et al. 2020).

In recent years, adults and nymphal instars of both *C. m. orientalis* and *M. fuliginosa* have become increasingly common for agrocenoses of the south of Primorsky Krai. Besides, both species are exhibiting pest-like behavior. The article summarizes the data of observations conducted over the past years and lists the plants identified by the authors as those the insects feed on. The article also outlines comparative phenological features of ontogeny of the two bugs, and the distinctive features of adults and nymphs of both species at different stages of ontogeny.

Material and methods

The study was conducted in Primorsky Krai from May to October 1997–2021: material on hemipterans was collected; observations were carried out in natural habitats and stationary conditions with some bugs kept in cages (Markova et al. 2017a; 2017b; 2018). Comparative observations in cages and natural habitats were conducted from the moment of emergence of overwintered adult bugs in

 https://www.doi.org/10.33910/2686-9519-2023-15-2-231-243

the spring and the onset of oviposition to the hatching of nymphs, their maturation and molts of all five instars, up to the development of wings in new-generation adults. All the examination procedures were accompanied by photography of insects. To measure instar I–V nymphs, live insects were placed on a sheet of graph paper with 1-mm grid, oriented along the grid lines, and photographed. The images were processed in the FastStone Image Viewer program. Under natural conditions, we carried out observations of insect's feeding, recorded signs of damage, wilting and drying of plant fragments located above the sucking site. We also took note of the parts of plant used (selected) by bugs.

Results and discussion

A study of dietary preferences of two leaf-footed bug species (Aistova et al. 2019; Markova et al. 2019; 2020; 2021a) identified the following food plants as common for their diet (Table 1).

As can be seen in Table 1, the common microstations and food items for *C. m. orientalis* and *M. fuliginosa* in agrocenoses are plants of the families Rosaceae (*Rubus idaeus*, *R. caesius*); in natural cenoses, Rosaceae (*Filipendula palmata*, *Agrimonia striata*, *Sanguisorba officinalis*) and Asteraceae (*Ambrosia artemisiifolia*). Bugs were observed feeding on these plants by sucking the sap. In 2021, at stationary sites, the authors managed to document the full development of *C. m. orientalis* on *Rubus idaeus*, starting with oviposition and all nymphal instars to the first flight of adults, which confirmed the suitability of red raspberry as a food for both nymphs and adults.

According to the authors' observations, *M. fuliginosa* can have a complete development cycle from egg laying to the adult stage on *Rubus idaeus* and *R. caesius*. Instar II–V nymphs migrate to the upper parts of plants, sucking the sap from young shoots and inflorescences. As a result, they disrupt the normal development of leaf blades, cause depression of the apex, withering of the apical part of shoots, and premature falling of flower buds. Leaf-footed bugs exert a negative impact on the physiology of cultivated Rosaceae, but the actual damage caused by them in Primorsky Krai has not yet been estimated (Markova et al. 2021a). With further observations, more detailed information about the food spectrum of these helipterums will be collected.

Some behavioral patterns of the two species have also been documented. When nymphs

Table 1

Food plants of two coreid bug species in Primorsky Krai

Таблица 1

Кормовые растения двух видов клопов в Приморском крае

Coreus m. orientalis	*M. fuliginosa*
Rosaceae: *Filipendula palmata* (Pall.) Maxim., *Agrimonia striata* Michx., *Rubus idaeus* L., *R. caesius* L., *Sanguisorba officinalis* L.	Rosaceae: * *Filipendula palmata* (Pall.) Maxim., *Agrimonia striata* Michx., *Rubus idaeus* L., *R. caesius* L., *Sanguisorba officinalis* L.
Asteraceae: *Ambrosia artemisiifolia* L.	Asteraceae: *Ambrosia artemisiifolia* L., *Cirsium pendulum* Fisch., *C. setosum* (Willd.) Bess.
Polygonaceae: *Rumex acetosa* L., *R. acetosella* L., *R. confertus* Willd., *R. crispis* L., *R. altaicum* Losinsk., *Rh. undulatum* L., *Persicaria lapathifolia* (L.) S. F. Gray.	—
Grossulariaceae: *Ribes rubrum* L.	—

Note: * stands for *M. fuliginosa*, this plant is reported for the first time; en-dash (—) means that the plant was not found in the diet of the species

Примечания: * — для *M. fuliginosa* указывается впервые; «—» — в питании вида не отмечены

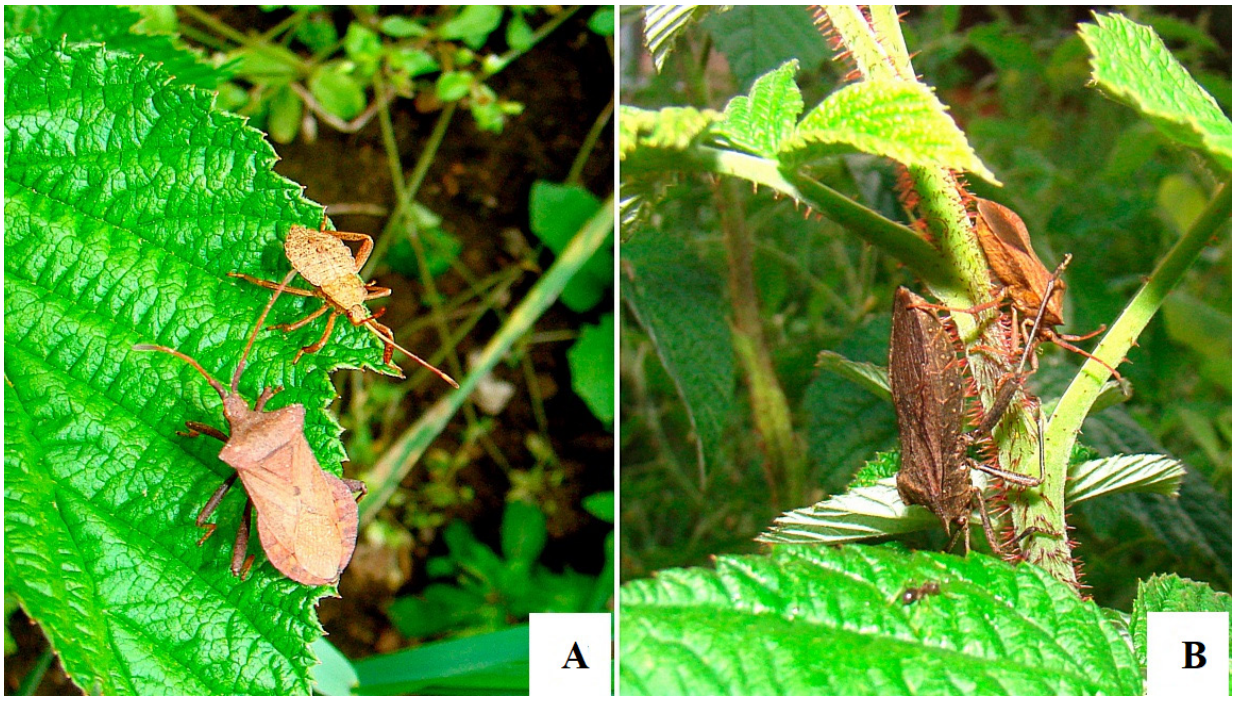

Fig. 1. Behavioral patterns exhibited by *Coreus marginatus orientalis* and *Molipteryx fuliginosa* when encountering each other: *A* — tapping the competitor with the antennae when a nymph and an adult of different species meet; *B* — active contact between adults of the two species, with an attempt to push the competitor off. Photo by M. Maslov

Рис. 1. Поведение *Coreus marginatus orientalis* и *Molipteryx fuliginosa* при встрече: *A* — ощупывание конкурента усиками при встрече личинки и имаго разных видов; *B* — активное контактное взаимодействия двух видов имаго, попытка столкнуть соперника. Фото М. Маслова

and adults of different coreid species met, the competitors were observed to tap each other with their antennae (Fig. 1: *A*). There were also cases of active contact between *C. m. orientalis* and *M. fuliginosa* on red raspberry, where a bug *M. fuliginosa* would even throw the competitor down to the ground (Fig. 1: *B*). This confirms the observations made by Dolling (W. R. Dolling 2006) on some males from the tribe Mictini that exhibit the ability to throw off rival males and potential predators with their hind legs armed with strong spines and outgrowths.

In nature, during the copulation and oviposition season, adult *C. m. orientalis* formed aggregations or swarming of 10 or more individuals on favorite food plants from the family Polygonaceae, rhubarb and sorrel, from wax to full ripeness of seeds. Nymphs of earlier instars, after hatching from eggs, remained on the same plant; from instar III, they dispersed to additional food plants with the number of bugs in the adult and nymphal stages not exceeding 1–3 individuals (Markova et al. 2020). According to the observations by V.G. Putshkov, nymphal and adult dock bugs fed mainly on contents of seeds of their food plants with the preference for the milk ripeness phase (Putshkov 1962). Since 2014, *C. m. orientalis* expanded its food preferences and changed behavior. In July–August, during the extended mating season, aggregations of 5–7 individuals of *C. m. orientalis* of both sexes were observed on shrubs of *Rubus idaeus* feeding on the apical part of shoots from the fruit set stage to full ripeness.

Simultaneously, in the spring (from May and June) of the same year, 2014, the second bug species under study also appeared on red raspberry shrubs. The cases of mass mating of *M. fuliginosa* on red raspberry and dewberry during the emergence of young shoots and flower budding and the formation of aggregations of 10 or more adult individuals were

 https://www.doi.org/10.33910/2686-9519-2023-15-2-231-243

recorded from the agrocenoses. Both species laid eggs on leaf blades and stems of *Rubus idaeus*. While *M. fuliginosa* in the nymphal and adult stages used mainly vegetative parts of plants for feeding (Fig. 2: *A–B*), *C. m. orientalis* used generative organs such as fruit, while nymphs of the latter species occupied them until softening and physiological ripeness. Female *C. m. orientalis* sometimes laid eggs directly onto red raspberry fruit (Fig. 3: *A–D*).

The study of biology, in particular, phenology and the ontogeny cycle of the two species in nature also showed their differences and similarities (Table 2). Both species are univoltine, overwintering in the adult stage.

Table 2 shows that the recorded timing of mating of overwintered adult *M. fuliginosa* on red raspberry was earlier than that of *C. m. orientalis*, whose mass mating occurs in spring on plants from the family Polygonaceae. The timing of nymphal development and wing formation of adult *M. fuliginosa* in nature lags behind starting with the third instar phase in the ontogeny of the bugs.

Being representatives of the same higher taxon Coreidae, adult *C. m. orientalis* and *M. fuliginosa* have morphological similarities: the body in both species is large, with a relatively small head that is much narrower than the pronotum; the antennae are long; and the abdomen is greatly expanded in the middle. However, they also have obvious differences: the bugs differ in size and by specific features listed below (Table 3, Fig. 4: *A–D*, Fig. *5*).

Many researchers, including Soviet heteropterologists, noted that the skill to identify bugs in pre-adult phases is very important for the purposes of predicting and taking timely preventive and control measures before pests do any harm (Putshkov, Putshkova 1956; Putshkova 1957). The skill of diagnosing these species may also come in handy for amateur gardeners. The study of the life cycles of the two leaf-footed bugs revealed some differences in egg laying grounds, as well as in egg size and color (Table 4).

In the early stages of ontogeny, nymphs of the two species differ by antennae, abdomen structure, hairs, body color and shape of legs. At later instar phases, nymphs of the two species have distant resemblance, which makes it necessary to distinguish the species at nymphal stages (Table 5, Figs. 6–7).

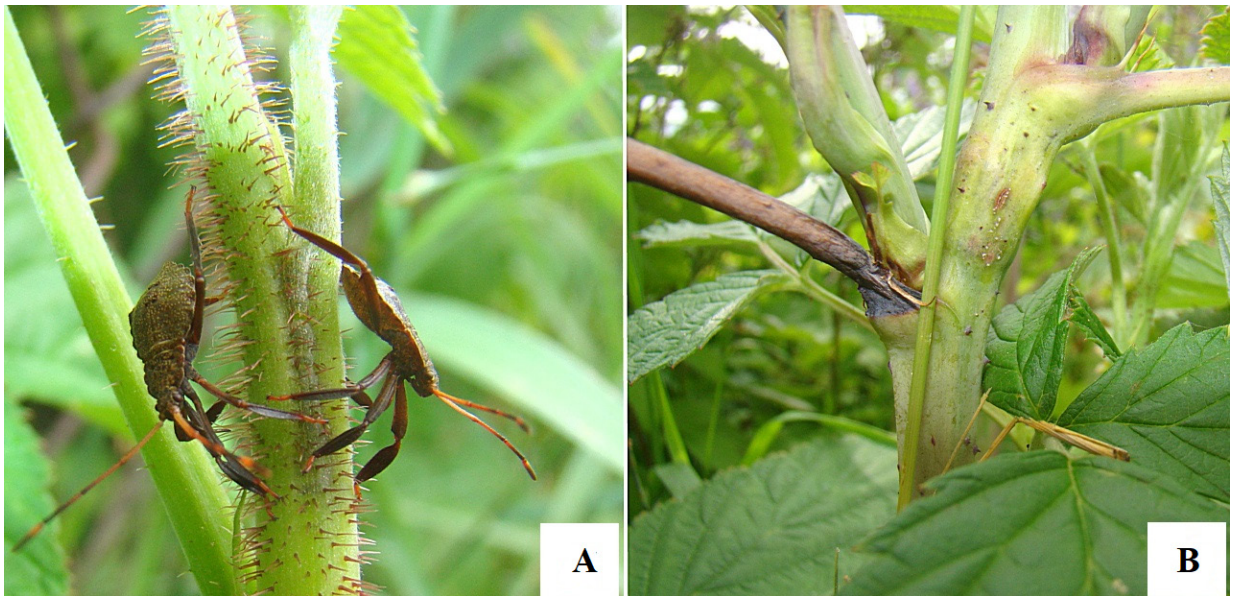

Fig. 2. *Molipteryx fuliginosa* feeding on vegetative parts of red raspberry: *A* — instar II nymph on the apical part of a shoot; *B* — traces of sucking and necrosis on a part of the shoot. Photo by M. Maslov

Рис. 2. Питание *Molipteryx fuliginosa* на вегетативных частях малины обыкновенной: *A* — личинки II возраста на апикальной части побегов; *B* — следы сосания и некроз части побега. Фото М. Маслова

Table 2

Phenology of two coreid bug species in natural conditions and stationary cages in Primorsky Krai

Таблица 2

Фенология двух видов клопов в естественных условиях и стационарных садках на территории Приморского края

Stage or physiological period	*C. m. orientalis*	*M. fuliginosa*
Adult	End of the 1st ten days of May	
Mating and oviposition	Early June to early August.	The 1st ten days of May to the end of the 1st ten days of August.
Timing of nymph emergence		
Instars I and II	Developing almost synchronously and fitting into the period from the 2nd to the 3rd ten days of June.	
Instar III	From end of the 3rd ten days of June to the beginning of the 1st ten days of July.	From the beginning of the 1st ten days of July.
Instar IV	From the beginning of the 1st ten days of July.	From the end of the 1st to the beginning of the 2nd ten days of July.
Instar V	From the beginning of the 2nd ten days of July.	From the beginning of the 3rd ten days of July.
Adult	From the end of the 3rd ten days of July to the beginning of the 1st ten days of August and to mid-October.	From the middle of the 2nd ten days of August to mid-October.

Instar IV nymphs of *C. m. orientalis* become similar in body size to instar III nymphs of *M. fuliginosa* and distantly resemble each other when viewed with naked eye. Their differences are as follows:

Coreus m. orientalis: instar IV nymphs are well distinguished by their wide antennae, with the 1st segment of the antennae three-edged, markedly thicker than others, the 2nd and 3rd segments leaf-like flattened, and only the 4th segment cylindrical. The legs are generally thin, with the femora only slightly flattened, and tibiae not flattened at all. The sharp outgrowths on the lateral margins of the abdomen and excretory ducts shortened, but still visible. Starting from instar III, and especially in instar V,

Table 3

Morphological differences between adults of two coreid bug species

Таблица 3

Морфологические отличия имаго двух видов клопов сем. Coreidae

Coreus m. orientalis	*M. fuliginosa*
Smaller in size, body length 12–15 mm. Color of the upper body brown or reddish-brown.	Larger in size, body length 19–25 mm. Color of the upper body dark brown to coal-black.
Lateral angles of pronotum directed sideward almost horizontally, with its margins being straight behind them; anterior margins of pronotum without teeth (Fig. 5: *A*).	Lateral angles of pronotum bent anteriorly, with its margins forming rounded blades behind; anterior margins of pronotum with teeth (Fig. 5: *B*).
Two converging sharp spines on head, between bases of antennae (Fig. 5: *A*). First segment of antennae three-edged.	Converging sharp spikes on head, between bases of antennae absent. All segments of antennae cylindrical (Fig. 5: *B*).
Femora in males thicker than in females, have groove at the bottom, with rows of tubercles arranged along its sides; tibiae slightly curved, with their apices not armed with spines (Fig. 4: *A*). In females, tibiae straight, covered with small tubercles (Fig. 4: *B*).	Femurs of forelegs and midlegs with two teeth near apex; femora of hindlegs thickened and armed with strong tubercles and large tooth at apex; inner margin of male hindleg tibia in the apical third expanded into triangular blade, absent in females (Fig. 4: *C–D*).

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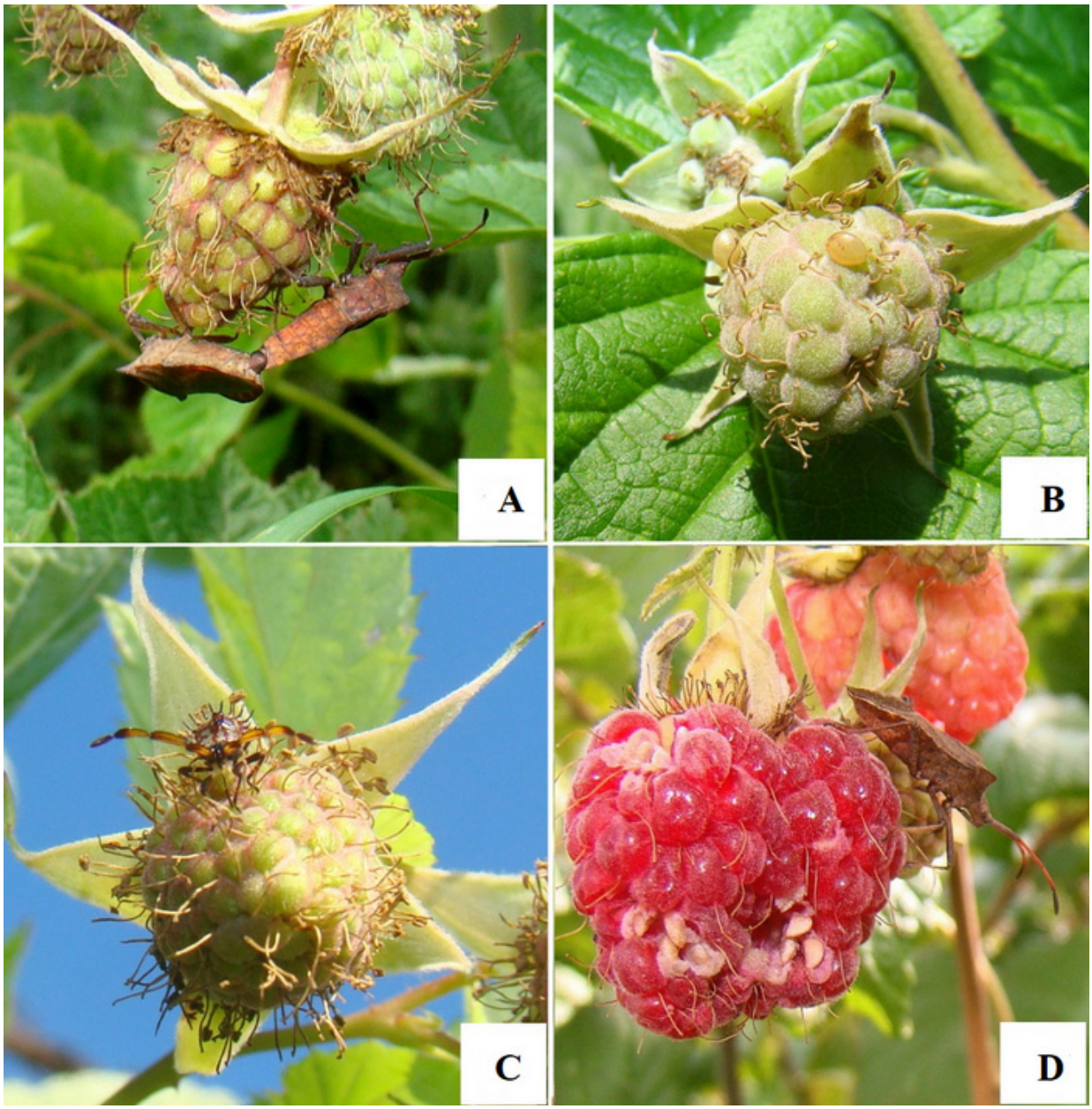

Fig. 3. *Coreus marginatus orientalis* breeding and feeding on generative organs of red raspberry: *A* — adults mating on an unripe fruit; *B* — eggs laid by a female directly on a raspberry fruit; *C* — an instar II nymph sucking the fruit cell sap; *D* — red raspberry drupelets drying after being eaten by leaf-footed bugs. Photo by M. Maslov

Рис. 3. Размножение и питание *Coreus marginatus orientalis* на генеративных органах малины обыкновенной: *A* — копуляция имаго на незрелом плоде; *B* — яйца, отложенные самкой непосредственно на плод малины; *C* — личинка II возраста, сосущая клеточный сок плода; D — усыхание костянок в результате питания клопов на плодах малины. Фото М. Маслова

the anteriorly directed and pointed outgrowths appear on the head and on the anterior surface of the antennal tubercles (Fig. 7).

M. fuliginosa: instar III nymphs are well distinguished by thin antennae with cylindrical segments approximately equal in thickness, not flattened. The legs are generally wide, with the femora and tibiae flattened. The abdomen is oval; its lateral margins are without sharp protrusions. The antennal tubercles on the anterior margin of the head lack pointed outgrowths directed anteriorly (Fig. 6).

Table 4

Oviposition and morphological parameters of eggs of two coreid bug species

Таблица 4

Яйцекладка и морфологические показатели яиц двух видов клопов

Characteristic	*Coreus m. orientalis*	*M. fuliginosa*
Egg laying grounds in natural conditions	On main food plants and soil beneath.	On any plants, dry fragments, and soil.
Size	Eggs are smaller (H = 1.89, D = 1.14), with the number of micropylar tubercles 16–18.	Eggs are markedly larger and wider (H = 2.55, D = 1.74), with the number of micropylar tubercles 64–69.
Color	Varying from brown to light yellow or golden; sometimes with marble, brownish-yellow streaks; the surface always clean and glossy.	Bronze-brown, matte, often covered with whitish secretion of females.

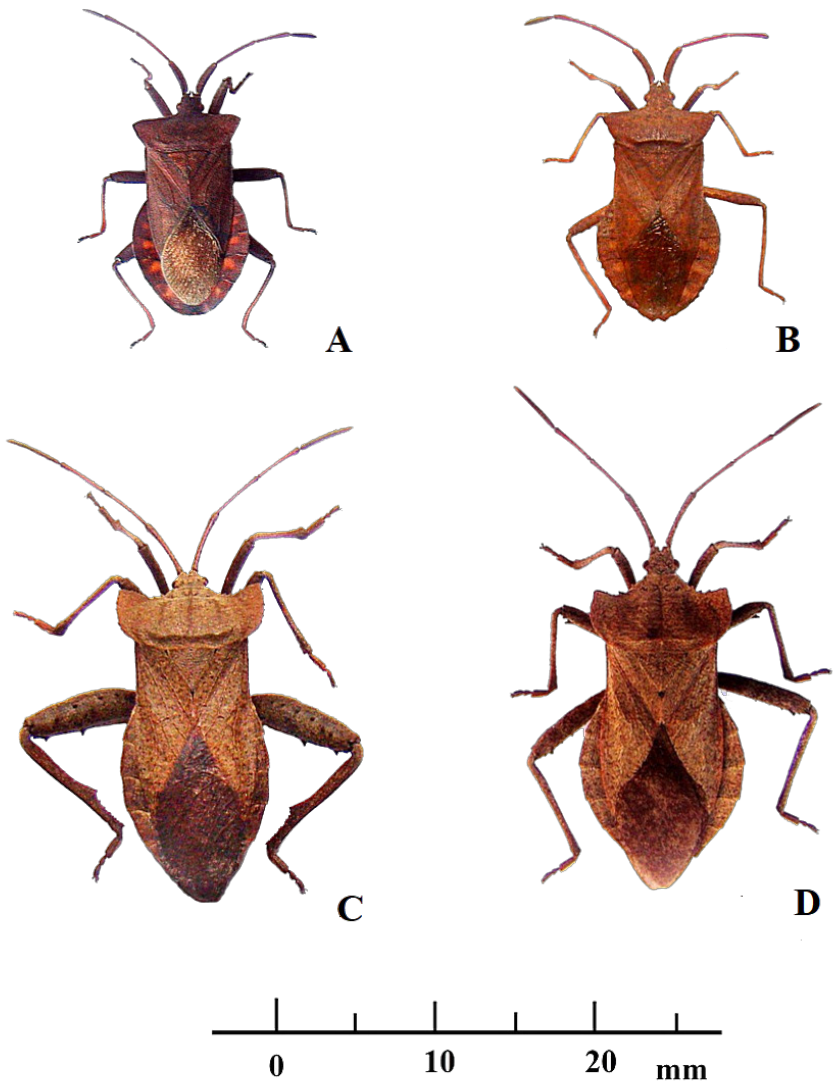

Fig. 4. Adult leaf-footed bugs (Coreidae): *A* — *Coreus marginatus orientalis*, male; *B* — *C. m. orientalis*, female; *C* — *Molipteryx fuliginosa*, male; *D* — *M. fuliginosa*, female. Photo by M. Maslov

Рис. 4. Имаго Coreidae: *A* — *Coreus marginatus orientalis*, самец; *B* — *C. m. orientalis*, самка; *C* — *Molipteryx fuliginosa*, самец; *D* — *M. fuliginosa*, самка. Фото М. Маслова

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Table 5

Morphological differences between the nymphal instars of two coreid bug species

Таблица 5

Морфологические отличия личинок двух видов клопов

Coreus m. orientalis	*M. fuliginosa*
Early instar nymphs: I, II, III (Fig. 6)	
Antennae look generally wide and flattened: 1st segment thicker than the others, three-edged; 2nd and 3rd segments leaflike and flattened; 4th segment elliptically cylindrical.	All antennae segments thin and cylindrical, with only 1st segment slightly thicker and longer than others; 4th segment flattened only in instar I; from instar II, cylindrical, pointed toward apex.
Shape of abdomen: abdomen diamond-shaped; lateral margins of all tergites with black outgrowths elongated in the form of triangular spines (blades) along margins of tergites IV–VII. Plates of scent glands rounded, black, with excretory ducts protruding from them in the form of two black spinules that grow longer from instars II and III and stretch into long black spines.	Abdomen oval in shape; lateral margins of abdominal tergites protruding, but without outgrowths. Plates of scent glands rounded, brown in color, without visible outgrowths.
Body color pattern: non-uniform, with head and thorax segments dark brown or black from above and with light median line; abdomen anteriorly light, with greenish or yellow hue, red V-shaped pattern in the anterior half, and red band running across abdomen through black plates of scent glands behind it. These color patterns persist in instars I, II, and III.	Body color uniform, yellow-brown to dark brown with randomly scattered small light hair-bearing spots of rounded shape. Medial part of body is lighter than the background. Abdomen without red pattern or band in the middle, but with thin brown edging along margins in instar I. In instar II and III nymphs, most spots in the anterior body merge, and color lightens.
Hairs: body covered with stiff black hairs, particularly thick on head and thoracic segments, and also on dark-colored areas of legs in all nymphal stages.	Body covered with short light hairs. Upper body covered with light hairs that grow thicker in instar V individuals.
Older instar nymphs: IV–V (Fig. 7)	
Legs not flattened, relatively thin, with all segments almost cylindrical in shape; only femora slightly wider and flattened, but without protrusions or spines.	Legs look wide and flat. Femora and tibiae in instar I flattened; in older stages, three-edged; from instar II, triangular protrusion develops on posterior sides of all femora in front of apex, with spines forming at its tip in instars III–V. In instar V, inner margin of male hindleg tibia flattened, with triangular blade formed at its apical third.
Lateral angles of pronotum pointed and stretched horizontally.	Lateral angles of pronotum pointed and stretched anteriorly.
Abdomen becomes almost oval in shape; outgrowths on lateral margins of tergites and on excretory ducts shortened in instar IV, and in instar V remain in the form of small protrusions.	Abdomen oval, lateral margins of tergites and excretory ducts lack protrusions.
Body color becomes more uniform, with head and thorax segments light brown from above and abdomen without the reddish pattern.	Body color uniform; from instar IV, some individuals acquire rusty coating on their legs, body, and head.

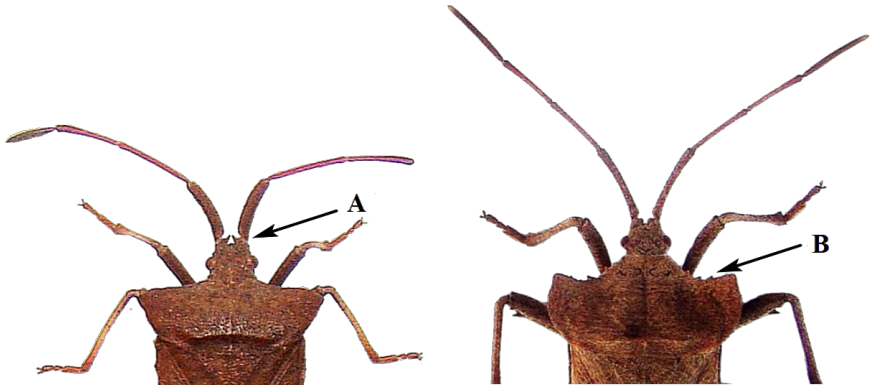

Fig. 5. *Coreus marginatus orientalis* (left) and *Molipteryx fuliginosa* (right): *A* — two converging sharp spines on the head located between the antennae bases; *B* — lateral angles of the pronotum bent anteriorly, its margins behind forming rounded lobes, anterior margins with teeth

Рис. 5. *Coreus marginatus orientalis* (слева) и *Molipteryx fuliginosa* (справа): *A* — два сходящихся острых шипа на голове, между основаниями усиков; *B* — боковые углы переднеспинки загнуты вперед, ее края позади образуют округлые лопасти, передние края переднеспинки усажены зубчиками

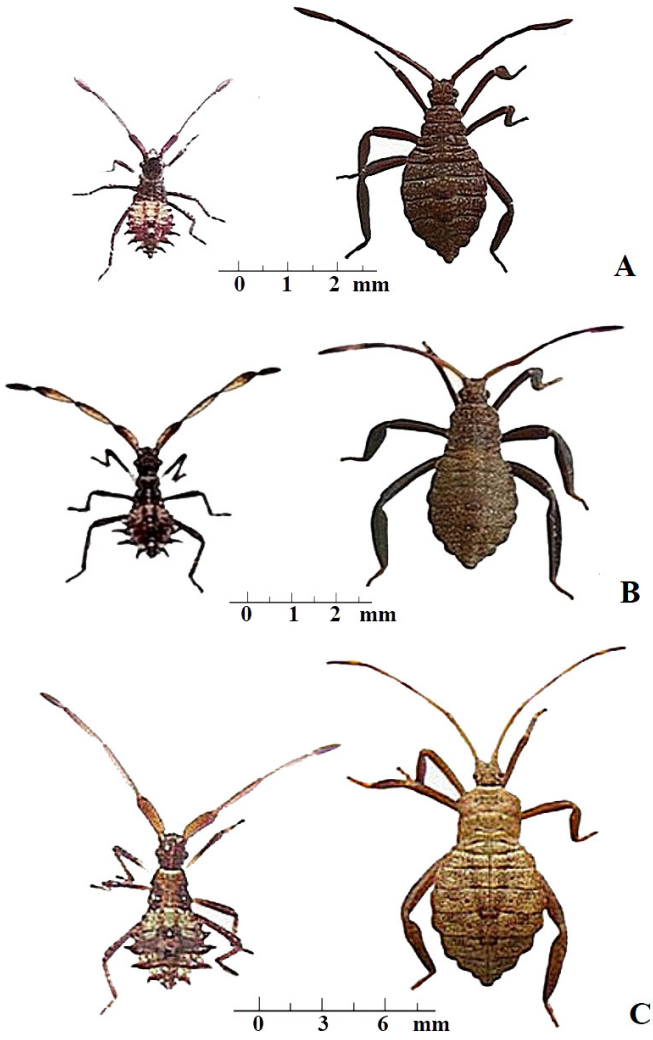

Fig. 6. Early instar nymphs of the leaf-footed (Coreidae) bugs *Coreus marginatus orientalis* (left) and *Molipteryx fuliginosa* (right): *A* — instar I; *B* — instar II; *C* — instar III. Photo by M. Maslov

Рис. 6. Личинки Coreidae ранних возрастов — *Coreus marginatus orientalis* (слева) и *Molipteryx fuliginosa* (справа): *A* — I возраст; *B* — II возраст; *C* — III возраст. Фото М. Маслова

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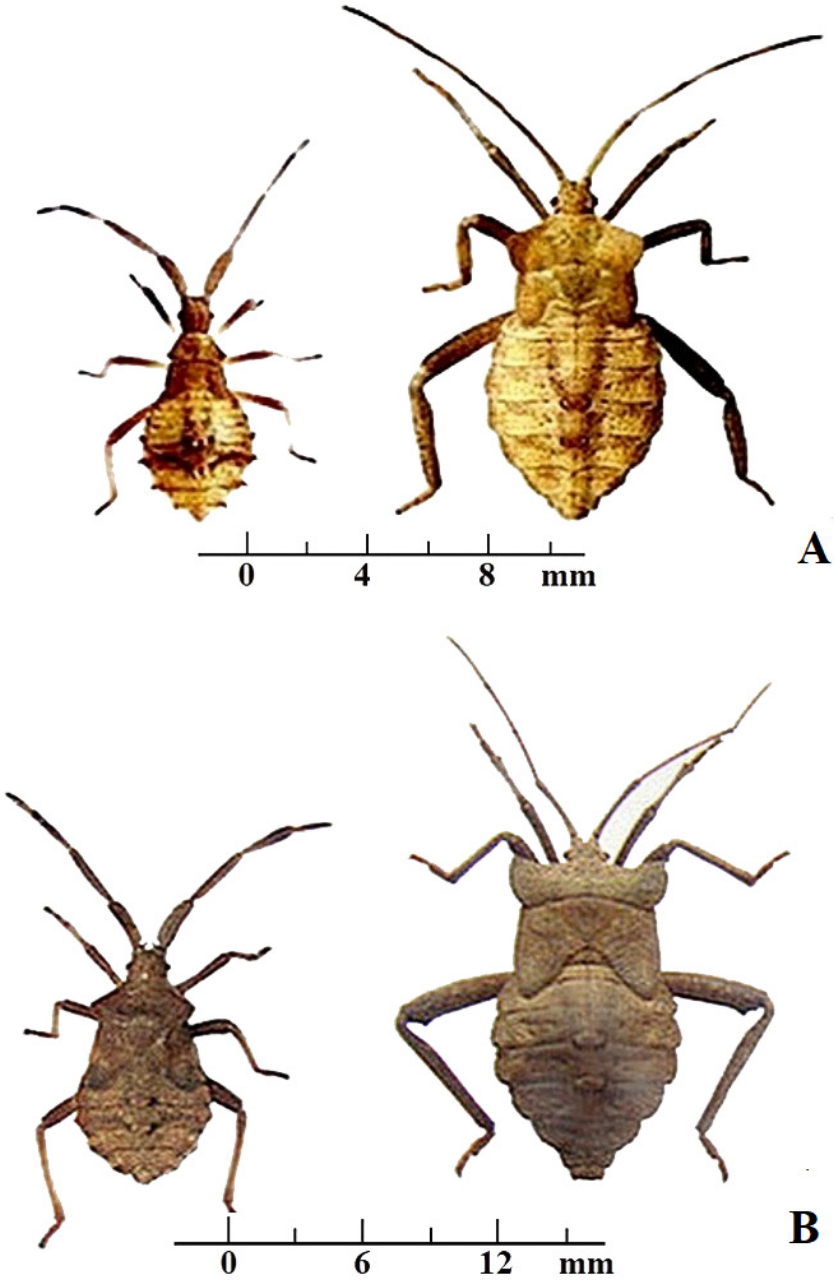

Fig. 7. Late instar nymphs of the leaf-footed (Coreidae) bugs *Coreus marginatus orientalis* (left) and *Molipteryx fuliginosa* (right): *A* — instar IV; *B* — instar V. Photo by M. Maslov

Рис. 7. Личинки Coreidae старших возрастов — *Coreus marginatus orientalis* (слева) и *Molipteryx fuliginosa* (справа): *A* — IV возраст; *B* — V возраст. Фото М. Маслова

Conclusion

Over the past eight years, the two bug species from the family Coreidae — the dock bug *C. m. orientalis* and *M. fuliginosa*, an invasive species from Southeast Asia, — have become serious pests in the agrocenoses in the south of the Russian Far East. Aggregation (a kind of swarming), mating, and oviposition of these insects occurs on cultivated red raspberry, dewberry, and their remontant varieties. According to our observations at stationary sites and evidence received from collectors and amateur gardeners, their complete development from nymph to the adult stage is possible on red raspberry and dewberry.

The knowledge of phenological features of the two bug species can contribute to the reduction of their pressure on plants. *M.*

fuliginosa colonize plants from May and June, during the emergence of young shoots and flower budding; instar II–V nymphs migrate to the upper parts of plants, thus, causing disturbance of the normal development of leaf blades, depression of the apex, and wilting of the apical part of shoots. To control these pests, the following recommendations can be made to gardeners: collect copulating insects from garden plants to reduce the number of eggs laid on raspberry leaves and stems and treat plants within the 2nd ten days of June to eliminate early instar nymphs.

The onset of mating and oviposition in *C. m. orientalis* in Primorsky Krai is observed in early June on wild plants from the family Polygonaceae, where nymphs of early instars remain. From instar III, they disperse to additional food plants. In July and August, mating and oviposition of dock bug in agrocenoses is observed on red raspberry shrubs, where insects prefer the apical part of shoots from the phase of fruit set to their full ripeness. When feeding on red raspberry fruit, bugs cause drying of drupelets and damage to receptacles. To control the pests, we recommend treating the plants in the 2nd ten days of July before fruit ripening.

Thus, both bug species have a negative impact on the physiology of cultivated plants in agrocenoses. Further observations of these Coreidae species are required in order to assess the actual damage they cause in Primorsky Krai and to include them in the list of potential pests of cultivated Rosaceae.

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