

## Distribution of the Lady Beetles (Coleoptera, Coccinellidae) in Plant Formations in the Russian Far East

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**Abstract** Ninety-two species of the family Coccinellidae are known from the Russian Far East. The characteristic features of the distribution of the Coccinellidae in biotopes in the Far East are determined by topography, geographic position of the region, richness of the flora, and economical activity of man. In forest formations, the greatest species diversity is found in the broad-leaved forests where 35 species of Coccinellidae are known.

**Key words** Lady beetles; fauna; ecology; geographic and biotopic distribution; Russian Far East.

Lady beetles (Coccinellidae) constitute one of the largest families of coleopteroid insects, including over 5,000 species. The Palearctic region accounts for about 700 species, with 221 species in 45 genera recorded from the former Soviet Union. The overwhelming majority of lady beetles are predators, feeding on aphids, psyllids, whiteflies, mealybugs, scales, thrips, spider mites, leaf beetle larvae and other small arthropods and are natural regulators of these pests.

The present work is founded upon material collected in field the by the authors in various natural climatic zones of the Far East (1969–2000). Specimens were obtained from diverse plant communities in Kamchatka, Magadan, Amur, Sakhalin regions, Primorski krai and Khabarovsk territory. Both expeditions and stationary studies were conducted.

Our investigations have established that the coccinellid fauna of the Russian Far East includes 92 species in 35 genera, 11 tribes and 6 subfamilies. In contiguous Far Eastern territories composition of coccinellid fauna is well studied. Recorded are 153 species from Japan (SASAJI, 1971), 320 species in China (PANG, MAO, 1979), 246 species in Vietnam (HOANG, 1982), 196 species in Taiwan (YU, WANG, 1999), 91 species in Korea (PARK, 1993), 86 species in Mongolia (BIELAWSKI, 1984), 88 species in Canada (BELICEK, 1976), and 475 species in America North of Mexico (GORDON, 1985).

Species composition and occurrence of the Coccinellidae are presented in Table 1. *Harmonia axyridis*, *Coccinella septempunctata septempunctata*, *Propylea quatuordecimpunctata* and *Calvia quatuordecimguttata* are the most abundant species in the Far East. Coccinellid fauna of Primorye is the richest in species composition. Number of species observed are: 67 over the territory of Primorye, 55 in the Amur Region, 50 in Khabarovsk Territory, 40 in Sakhalin, 29 in Magadan Region, 23 in Kuril Islands, and 20 in Kamchatka (KUZNETSOV, 1993, 1997; KUZNETSOV, ZAKHAROV, 2000).

The formation of the regional fauna of Coccinellidae as well as of other insects passed is influenced with three basic types of vegetation: boreal (taiga), nemoral (broad-leaved) and

steppe. Evolution of coccinellid fauna was mainly determined by features of geographic position, relief and geological history.

Coccinellidae are subdivided into the following groups according to the taxonomic group of their hosts: 1. aphidophages (58 species), 2. coccidophages (23 species), 3. phyllophages (4 species), 4. micetophages (3 species), 5. mixoentomophages, feeding on various groups of insects (1 species), and acariphages (3 species). It should be noted that these subdivisions are to a great extent conventional, as some species feed on both aphids and coccids, but generally show a preference for one or the other. Besides, most coccinellid species, along with their main nutritional sources, will also feed on other small insects, including psyllids, whiteflies, and thrips. The majority of coccinellid species (85) in the Far East of Russia are the predators of insects and other small arthropod pests, but the following 4 species are phyllophagous: *Henosepilachna vigintioctomaculata*, *Subcoccinella vigintiquatuorpunctata*, *Cynegetis impunctata*, and *Epilachna chinensis*.

The first is a serious pest of potatoes and vegetables (cucumbers, tomatoes etc.) cultivated in Khabarovsk Territory and Primorsky Territory. Under local conditions the remaining 3 species live on the grassy vegetation of meadows; they have not yet been recorded on cultivated plants.

Most coccinellid species are strictly confined with definite biotopes and type of vegetation. Depending on preferred type of vegetation we distinguish 3 basic ecological complexes: 1) dendrobionts, 2) eurybionts, and 3) chortobionts. In the Far East, some species may shift to other biotopes. Thus in Siberia, Europe and southern Far East, *Anatis ocellata* is usually observed in crowns of conifers but feeds in mass on aphids damaging broad-leaved trees in flood-plain forests in Kamchatka and Magadan Region. While moving northward, lady beetles select more arid and well warmed habitats with rare vegetation in river valleys. Moving southward same species inhabit more dewy and shady habitats with dense plant cover. Zonal change of habitats is common among transzonal species.

On the vast territory of the Far East with its various climatic conditions, relief and geological history, the following habitats are recognized: tundra, coniferous forests, mixed forests, and forest-steppe.

The tundra and forest-tundra cover extensive area on the north of Magadan Region, Kamchatka and Chukotka. Species composition of Coccinellidae is very scarce in the tundra. Holarctic species prevail here: *Anisosticta bitriangularis*, *A. strigata*, *Adonia arctica*, *Ceratomegila ulkeni*, *Hippodamia tredecimpunctata*, *Adalia bipunctata frigida*, *Coccinella hieroglyphica mannerheimi*, *Calvia quatuordecimguttata*. Boreal species *Anatis ocellata*, *Myzia gebleri* and *Hyperaspis kamtchaticus* occur in shrubby bushes of cedar elfin wood.

In the light coniferous taiga located southward to the tundra and covering wide area in Magadan Region, Kamchatka and Sakhalin, fauna of Coccinellidae is presented by boreal species. Holarctic (*Coccinella trifasciata*, *C. nivicola*, *C. hieroglyphica mannerhaimi*, *C. transversoguttata*, *Adalia bipunctata frigida*, *Anisosticta bitriangularis*, *Hippodamia tredecimpunctata*), transpalearctic (*Hippodamia septemmaculata*, *Anisosticta novemdecimpunctata*, *Stethorus punctillum*, *Coccinella s. septempunctata*, *Propylea quatuordecimpunctata*), Eurasian taiga (*Scymnus abietis*, *Myzia oblongoguttata*, *Adalia conglomerata*, *Anatis ocellata*), Trans-Siberian (*Myzia gebleri*, *Harmonia axyridis*), and East Siberian (*Anisosticta sibirica*, *Adonia amoena*) species occur here.

For the dark coniferous taiga that prevails in Lower Priamurye, at the coast of the Sea of Okhotsk, in Sakhalin, northern and central Kuril Islands and in Primorye in Sikhote-Alin moun-

tains above 700-800 meters, typical taiga species of Coccinellidae are abundant: *Scymnus nigrinus*, *S. abietis*, *Adonia conglomerata*, *Anatis ocellata*, *Myzia oblongoguttata*, *Harmonia quatuordecimguttata*, *Exochomus quadripustulatus*. Species complex of spruce-fir forests of northern Sikhote-Alin and Sakhalin is the richest one and includes *Myzia gebleri*, *Anatis ocellata*, *Harmonia axyridis* and some other species.

Fauna of Coccinellidae in the mixed and broad-leaved forests covering wide territory on the south and southeast of Primorye, middle Priamurye, Southern Sakhalin and Southern Kuril Islands is very specific and diverse. Transpalearctic species are distributed here: *Serangium lygaenum*, *Stethorus amurensis*, *St. yezoensis*, *Pseudoscymnus hareja*, *Scymnus lambatus*, *S. dorcatomoides*, *Chilocorus rubidus*, *Ch. inornatus*, *Ch. kuwanae*, *Rodolia limbata*, *R. concolor*, *Eoadalia koltzei*, *Coccinella ainu*, *C. sachalinensis*, *Propylea japonica*, *Aiolocaria hexaspilota*, *Sumnius nigrofuscus*, *Anatis halonis*, *Hyperaspis amurensis*. Holarctic (*Calvia quatuordecimguttata*, *C. duodecimmaculata*), transpalearctic (*Stethorus punctillum*, *Coccinella s. septempunctata*, *Propylea quatuordecimpunctata*, *Oenopia conglobata*, *Chilocorus bipustulatus*, *Ch. renipustulatus*, *Halyzia sedecimguttata*, *Calvia decimguttata*, *Vibidia duodecimguttata*), Eurasiatic taiga and forest (*Scymnus nigrinus*, *S. ferrugatus*, *S. suturalis*, *Adalia conglomerata*, *Anatis ocellata*, *Myzia oblongoguttata*, *Cavia quindecimguttata*), and Trans-Siberian (*Myzia gebleri*, *Harmonia axyridis*) species are also common in the tops of conifers and broad-leaved trees in deciduous and mixed forests. *Coccinella septempunctata brucki* occurs in grass meadows in Sakhalin and Kuril Islands.

In the Far East, the forest-steppe covers small areas in middle Priamurye (Zeisko-Bureinskaya plain) and Primorye (Prihankaiskaya plain). Fauna of lady beetles of the forest-steppe includes species from different biocenosis but meadow species are the most abundant. Typical steppe species occurring here are *Adonia amoena*, *Coccinella transversoguttata*, *C. undecimpunctata*, *Semiadalia apicalis*, *Coccinella nigrovittata*, *Adalia bipunctata fasciopunctata*, *Hyperaspis erythrocephala gyotokui*, *Subcoccinella vigintiquatuorpunctata*. Manchurian (*Hyperaspis leechi*, *H. amurensis*, *Chilocorus inornatus*, *Ch. kuwanae*, *Scymnus crinitus*, *Oenopia bissexnotata*, *Rodolia concolor*, *Exochomus mongol*, *Coccinella ainu*), pan-palearctic (*Rodolia limbata*, *Hyperaspis asiatica*, *Epilachna chinensis*), and Indo-Malayan palearctic (*Sumnius nigrofuscus*, *Chilocorus rubidus*, *Aiolocaria hexaspilota*) species also present in forest-steppe. These species represent the major part of the species complex of this zone. The forest-steppe is also inhabited by many species, which are characteristic for forests, meadows, peatbogs and pigweeds. In southwestern Primorye in the pine-oak forests, common for coniferous species of Coccinellidae occur.

Study of zonal faunistic complexes of Coccinellidae in Far East allows to reveal peculiarities of landscape distribution of separate species and to display their relation to definite biotopes. The distribution of coccinellids in various biotopes is determined by their food specificity, and ecologically determined by need for certain environmental conditions developed in the course of each species' evolution. Food specificity is characteristic of lady beetles, and greatly influences their biotopic distribution. The reproduction of predaceous coccinellids depends on the availability of prey insects. Lack or scarcity of such insects may motivate carnivorous lady beetles to relocate to a different habitat. It has been noted that during the vegetational season, aphids migrate from one host plant to another. They are followed by the migration of aphid-feeding lady beetles. However, this type of migration does not influence the general rules for their distribution within biocenoses. The coexistence of eurytopic, nearly ubiquitous species

with more stenotopic species creates difficulties in the recognition of discrete lady beetle biotopes. Additionally, some species have a preference to forest vegetation, some prefer herbaceous vegetation, and others readily accept both.

Lady beetles possess a vast ecological flexibility and occur in various plant communities. The characteristic features of the distribution of the Coccinellidae in biotopes in the Far East are determined by the topography, geographical position of the region, richness of the flora, and the economical activities of man. In forest formations in the Far East, the greatest species diversity is found in the broad-leaved forests. On trees and brushes of such forests 35 species occur, whereas the coccinellid fauna of other forest types is less diverse: the Coccinellidae of the mixed coniferous-broad-leaved forests count 32 species, of fir-spruce forests 23 species, of larch forests 21 species, of pine forests 19 species. In the belt of high mountain plants, represented by the alpine tundra, forest tundra and elfin woods (of *Pinus pupila*) we found 16 species of lady beetles.

For leafy trees in the broad-leaved and coniferous-broad-leaved forests the following species are characteristic: *Harmonia axyridis*, *Calvia* (An.) *quatuordecimguttata*, *C. (C.) decimguttata*, *C. (An.) duodecimmaculata*, *Propylea quatuordecimpunctata*, *Stethorus (S.) punctillum*, *Vibidia duodecimguttata*, *Halyzia sedecimguttata*, *Aiolocaria hexaspilota*, *Scymnus (P.) ferrugatus*. More rarely occur *Serangium lyganeum*, *Chilocorus rubidus*, *Ch. kuwanae*, *Ch. inornatus*, *Rodolia limbata*, *Oenopia bissexnotata*, and *Calvia (An.) quinquedecimguttata*.

In the crowns of conifers growing in the coniferous-broad-leaved and fir-spruce forests, the following typically coniferous species of lady beetles live, playing an important role in the regulation of adelges and other aphid species: *Adalia conglomerata*, *Scymnus (S.) abietis*, *S. (P.) suturalis*, *S. (S.) nigrinus*, *Anatis ocellata*, *A. halonis*, *M. oblongoguttata*, and *M. gebleri*, *Myzia oblongoguttata*, *Adalia conglomerata*, *Coccinella trifasciata*, *C. nivicola*, *C. hieroglyphica mannerheimi*, and *Anatis ocellata* occur in various types of leafy forests growing on vast territories in the northern areas of the Far East.

*Scymnus (S.) nigrinus*, *Myrrha octodecimguttata*, *Adalia conglomerata*, *Anatis ocellata*, *M. gebleri*, and *Coccinella nivicola* are characteristic of pine forests in the Amur region and Yakutia. *Adalia bipunctata frigida*, *Coccinella septempunctata*, *C. trifasciata*, *Calvia (An.) duodecimmaculata*, and *Anatis ocellata* dominate in the flood-plain leafy forests of the Magadan and Kamchatka regions.

The greatest density of coccinellids in forest cenoses is recorded from the forest edges, in felled areas, and in well-lit stands, where very often plant-sucking pests appear in masses. Under the denser canopy lady beetles are encountered only rarely. In various formations of herbaceous vegetation, the number and variety of species decrease with increasing humidity. The richest diversity of lady beetles is found in the steppes-meadows of Prikhankaiskaja and Zeisko-Bureiskaja valleys. The most depauperate fauna is found on peat-bogs and in the tundra of the northern Far East. Twenty-nine species of lady beetle live on the herbaceous vegetation of dry meadows; the usual cast includes: *Coccinella septempunctata*, *C. magnifica*, *C. trifasciata*, *Coccinula quatuordecimpustulata sinensis*, *Propylea quatuordecimpunctata*, *P. japonica*, *Adonia amoena*, *A. variegata*, *Scymnus (S.) frontalis*, *S. (S.) crinitus*, *S. (N.) redtenbacheri*, and *S. (N.) kolzei*.

*Hyperaspis erythrocephala gyotokui*, *H. asiatica*, *H. leechi*, *Stethorus punctillum*, *Scymnus (P.) haemorrhoidalis*, *S. (P.) limbatus*, *S. (S.) jakowlewi*, *S. (S.) rubromaculatus*, *Semiadalia apicalis* are characteristic of the steppes. Hygrophilous lady beetles dominate in peat-bogs:

Table 1: Distribution and occurrence of Coccinellidae in various landscapes of the Russian Far East. AG, Agroecosis; MD, meadow; M, mire; BL, broad-leaved forests; CBL, coniferous-broad-leaved forests; SF, spruce-fir forests; L, larch forests; P, pine forests; MTF, mountain tundra and forest tundra. Abundance is indicated by the following symbols: +++, abundant; ++, common; +, rare.

Species	Plant formations								
	AG	MD	M	BL	CBL	SF	L	P	MTF
Subfamily Stycholotinae									
1. <i>Serangium lygaeum</i> KHNZORIAN, 1972	-	-	-	+	+	-	-	-	-
Subfamily Scymninae									
2. <i>Stethorus (Stethorus) punctillum</i> WEISE, 1891	++	+	-	++	+	+	-	+	-
3. <i>S. (Allostethorus) amurensis</i> KHNZORIAN, 1972	-	-	-	+	-	-	-	-	-
4. <i>S. (A.) yezoensis</i> MIYATAKE, 1966	-	-	-	+	-	-	-	-	-
5. <i>Pseudoscymnus hareja</i> (WEISE, 1979)	-	-	-	+	+	-	-	-	-
6. <i>Scymnus (Scymnus) nigrinus</i> KUGELANN, 1794	-	-	-	-	+	+	+	++	-
7. <i>S. (S.) abietis</i> PAYKULL, 1798	-	-	-	-	+	++	+	-	+
8. <i>S. (S.) crinitus</i> FÜRSCH, 1966	+	++	+	-	-	-	-	-	-
9. <i>S. (S.) rubromaculatus</i> (GOEZE, 1777)	+	+	-	-	-	-	-	-	-
10. <i>S. (S.) jakowlewi</i> WEISE, 1892	-	+	-	-	-	-	-	-	-
11. <i>S. (S.) frontalis</i> (FABRICIUS, 1798)	+	++	-	-	-	-	-	-	-
12. <i>S. (Neopullus) fuscatus</i> BOHEMAN, 1858	-	+	++	-	-	-	-	-	-
13. <i>S. (Pullus) haemorrhoidalis</i> HERBST, 1797	+	+	-	-	-	-	-	-	-
14. <i>S. (P.) ferrugatus</i> (MOLL, 1785)	-	-	-	++	++	-	-	-	-
15. <i>S. (P.) formicarius</i> MULSANT, 1850	-	-	-	-	-	+	-	-	-
16. <i>S. (P.) auritus</i> THUNBERG, 1785	-	-	-	+	-	-	-	-	-
17. <i>S. (P.) limbatus</i> STEPHENS, 1831	-	+	-	-	-	-	-	-	-
18. <i>S. (P.) suturalis</i> THUNBERG, 1795	-	-	-	-	++	+	-	++	-
19. <i>S. (P.) dorcatomoides</i> WEISE, 1879	-	-	-	+	+	-	-	-	-
20. <i>Nephus redtenbacheri</i> (MULSANT, 1846)	-	+	-	-	-	-	-	-	-
21. <i>N. patagiatus</i> (LEWIS, 1896)	-	+	-	-	-	-	-	-	-
22. <i>N. koltzei</i> (WEISE, 1887)	+	++	-	-	-	-	-	-	-
23. <i>N. bipunctatus</i> (KUGELANN, 1794)	-	+	-	-	-	-	-	-	-
24. <i>N. koreanus</i> FÜRSCH, 1965	-	+	-	-	-	-	-	-	-
25. <i>N. wrasei</i> PÜTZ et KUZNETSOV, 1995	-	+	-	-	-	-	-	-	-
26. <i>Hyperaspis amurensis</i> WEISE,	+	++	-	-	-	-	-	-	-
27. <i>H. asiatica</i> LEWIS, 1846	+	+	-	-	-	-	-	-	-
28. <i>H. leechi</i> MIYATAKE, 1961	-	+	-	-	-	-	-	-	-
29. <i>H. kamtschaticus</i> KUZNETSOV et REN, 1996	-	-	-	-	-	-	-	-	+
30. <i>H. erythrocephala gyotokui</i> KAMIYA, 1963	+	++	-	-	-	-	-	-	-
Subfamily Chilocorinae									
31. <i>Chilocorus rubidus</i> HOPE, 1931	+	-	-	+	-	-	-	-	-
32. <i>Ch. inornatus</i> WEISE, 1887	+	-	-	++	+	-	-	-	-
33. <i>Ch. kuwanae</i> SILVESTRI, 1909	-	-	-	++	+	-	-	-	-
34. <i>Ch. renipustulatus</i> (SCRIBA, 1790)	-	-	-	+	-	-	-	-	-
35. <i>Ch. bipustulatus</i> (LINNAEUS, 1758)	-	-	-	+	-	-	-	-	-
36. <i>Exochomus (Exochomus) quadripustulatus</i> (LINNAEUS, 1758)	-	-	-	-	-	-	-	++	-
37. <i>E. (Parexochomus) nigromaculatus</i> (GOEZE, 1777)	-	+	-	-	-	-	-	-	-
38. <i>E. (Anexochomus) mongol</i> BAROVSKY, 1922	-	-	-	+	-	-	-	-	-
39. <i>Sumnius nigrofuscus</i> JING, 1983	-	-	-	+	-	-	-	-	-
40. <i>Coccidula rufa</i> (HERBST, 1783)	+	++	+++	-	-	-	-	-	-
41. <i>Rodolia limbata</i> (MOTSCHULSKY, 1866)	-	-	-	+	+	-	-	-	-
42. <i>R. concolor</i> (LEWIS, 1879)	-	-	-	+	-	-	-	-	-
Subfamily Coccinellinae									
43. <i>Anisosticta bitriangularis</i> (SAY, 1924)	-	+	+	-	-	-	-	-	-

44.	<i>A. novemdecimpunctata</i> LINNAEUS, 1758	-	-	+	-	-	-	-	-	-
45.	<i>A. strigata</i> (THUNBERG, 1795)	-	-	+	-	-	-	-	-	-
46.	<i>A. kobensis</i> LEWIS, 1896	+	++	++	-	-	-	-	-	-
47.	<i>A. sibirica</i> BIELAWSKI, 1958	+	++	+++	-	-	-	-	-	-
48.	<i>Ceratomegilla ulkei</i> CROTCH, 1873	-	+	-	-	-	-	-	-	-
49.	<i>Hippodamia tredecimpunctata</i> (LINNAEUS, 1758)	+++	+++	++	-	-	-	-	-	-
50.	<i>H. septemmaculata</i> (De GEER, 1775)	-	++	+	-	-	-	-	-	-
51.	<i>Adonia variegata</i> (GOEZE, 1777)	+	++	+	-	-	-	-	-	-
52.	<i>A. amoena</i> (FALDERMAN, 1835)	-	+++	-	-	-	-	-	-	-
53.	<i>A. arctica</i> (SCHNEIDER, 1787)	-	+	-	-	-	-	-	-	-
54.	<i>Semiadalia apicalis</i> (WEISE, 1879)	-	+	-	-	-	-	-	-	-
55.	<i>Adalia conglomerata</i> (LINNAEUS, 1758)	-	-	-	-	+++	++	++	++	++
56a.	<i>Adalia b. bipunctata</i> (LINNAEUS, 1758)	-	-	-	+	-	-	-	-	-
56.	<i>A. b. frigida</i> (SCHNEIDER, 1792)	-	-	-	++	-	+	-	-	+
56.,	<i>A. b. fasciatopunctata</i> FALDERMANN, 1825	-	-	-	+	-	-	-	-	-
57.	<i>Eoadalia koltzei</i> (WEISE, 1887)	-	-	-	-	+	-	-	-	-
58.	<i>Coccinella undecimpunctata</i> LINNAEUS, 1758	+	+	-	-	-	-	-	-	-
59.	<i>C. transversoguttata</i> LINNAEUS, 1758	-	-	-	+	-	+	+	-	+
60.	<i>C. trifasciata</i> LINNAEUS, 1758	-	+	-	-	-	++	++	+	+
61±.	<i>C. s. septempunctata</i> LINNAEUS, 1758	+++	+++	+	++	+	+	+	-	+
61.	<i>C. s. brucki</i> MULSANT, 1866	++	++	-	+	+	-	-	-	-
62.	<i>C. magnifica</i> REDTENBACHER, 1843	-	+	-	-	-	-	-	-	-
63.	<i>C. nivicola</i> MULSANT, 1850	-	-	-	-	-	+	++	+	+
64.	<i>C. nigrovittata</i> KAPUR, 1963	-	+	-	-	-	-	-	-	-
65.	<i>C. ainu</i> LEWIS, 1896	-	-	-	+	-	-	-	-	-
66.	<i>C. hieroglyphica mannerheimi</i> MULSANT,	-	-	-	-	-	+	++	-	+
67.	<i>C. sachalinensis</i> OHTA, 1928	-	+	-	-	-	-	-	-	-
68.	<i>C. quinquepunctata</i> LINNAEUS, 1758	-	+	-	-	-	-	-	-	-
69.	<i>Coccinula quatuordecimpustulata sinensis</i> WEISE, 1889	+++	+++	+	++	+	+	+	-	-
70.	<i>Oenopia conglobata</i> (LINNAEUS, 1758)	-	-	-	+	-	-	-	-	-
71.	<i>O. bissexnotata</i> (MULSANT, 1850)	-	-	-	+	-	-	-	-	-
72.	<i>Propylea quatuordecimpunctata</i> (LINNAEUS, 1758)	+++	+++	+	++	++	+	+	-	+
73.	<i>P. japonica</i> (THUNBERG, 1781)	+	++	-	-	-	-	-	-	-
74.	<i>Harmonia axyridis</i> (PALLAS, 1773)	+++	++	+	+++	+++	++	+	+	-
75.	<i>H. quadripunctata</i> (PONTOPPIDAN, 1763)	-	-	-	-	+	-	-	++	-
76.	<i>Myrrha octodecimguttata</i> (LINNAEUS, 1758)	-	-	-	-	-	-	+	+	-
77.	<i>Calvia (Calvia) decemguttata</i> (LINNAEUS, 1758)	+	-	-	++	+++	+	+	+	-
78.	<i>C. (Anisocalvia) duodecimmaculata</i> (GEBLER, 1832)	+	-	-	++	++	++	+	+	+
79.	<i>C. (A.) quatuordecimguttata</i> (LINNAEUS, 1758)	+	-	-	+++	+++	++	++	+	+
80.	<i>C. (A.) quindecimguttata</i> (FABRICIUS, 1777)	-	-	-	+	+	-	-	-	-
81.	<i>Myzia oblongoguttata</i> (LINNAEUS, 1758)	-	-	-	-	++	+	+	+	-
82.	<i>M. gebleri</i> (CROTCH, 1874)	-	-	-	-	++	++	++	+	+
83.	<i>Anatis ocellata</i> (LINNAEUS, 1758)	-	-	-	+	++	+	++	++	+
84.	<i>A. halonis</i> LEWIS, 1896	-	-	-	-	+	+	+	+	-
85.	<i>Aiolocaria hexaspilota</i> (HOPE, 1831)	-	-	-	++	-	-	-	-	-
86.	<i>Halyzia sedecimguttata</i> (LINNAEUS, 1758)	-	-	-	+	+	+	+	+	-

87. <i>Vibidia duodecimguttata</i> (LINNAEUS, 1758)	+	-	-	+++	++	+	-	-	-
88. <i>Psyllobora vigintiopunctata</i> (LINNAEUS, 1758)	+	++	-	-	-	-	-	-	-
Subfamily Epilachninae									
89. <i>Henosepilachna vigintiomaculata</i> (MOTSCHULSKY, 1857)	+++	+	-	+	+	-	-	-	-
90. <i>Epilachna chinensis</i> Weise, 1912	-	+	-	-	-	-	-	-	-
91. <i>Subcoccinella vigintiquatuorpunctata</i> (LINNAEUS, 1758)	-	+	-	-	-	-	-	-	-
92. <i>Cynegetis impunctata</i> (LINNAEUS, 1767)	-	++	-	-	-	-	-	-	-
Total	28	45	15	35	32	23	21	19	16

*Anisosticta sibirica*, *A. bitriangularis*, *A. kobansis*, *Coccidula rufa*, *Hippodamia tredecimpunctata*, *Hippodamia septemmaculata*, *Propylea quatuordecimpunctata*, *Coccinella septempunctata*, and *Adonia variegata* are found here. *Adalia bipunctata frigida*, *Adonia arctica*, *A. variegata*, *Coccinella hieroglyphica mannerheimi*, *C. trifasciata*, and *Anisosticta strigata* live on tundra vegetation.

Depauperate fauna is characteristic of a cultivated landscape, but at the same time some species may increase sharply. Adult beetles and larvae of *Coccinella septempunctata*, *Propylea quatuordecimpunctata*, *Harmonia axyridis*, *Coccinula quatuordecimpunctulata sinensis*, and *Hippodamia tredecimpunctata* occurred in high numbers on agricultural plantings in the southern Far East. Some years these predaceous Coccinellidae, along with other aphidophages, can effectively regulate the populations of aphids – important crop pests – in agrocenoses.

The species composition of coccinellids in orchards is made up of a subset of the same representatives found in the broad-leaved forest fauna. Sixteen species of lady beetles were recorded from orchards on apple trees, pear trees, plum trees, cherry trees, raspberry and currants. *Harmonia axyridis*, *Calvia* (*An.*) *quatuordecimguttata*, *Propylea quatuordecimpunctata*, *Coccinella septempunctata*, and *Stethorus* (*St.*) *punctillum* are dominant species there. (During the last years the number of the latter species has decreased due to intensive application of highly toxic pesticides in the orchards.) The larvae and adults of these beneficial coccinellids feed on the apple aphid *Aphis pomi* DEG., mealy plum aphid *Hyalopterus pruni* GEOFFROY, current aphid *Cryptomyzus ribis* L., apple sucker *Psylla mali* SCHM., pear psylla *Psylla pyricola* FRST., *P. pyrisudga* FRST., and *Dysaphis reaumuri* MORDV., as well as many species of coccids and spider mites.

Thus, in forest formations in the Far East, the greatest species diversity is found in the broad-leaved forests where 35 species occur. The Coccinellidae of the mixed coniferous-broad-leaved forests count 32 species, of the fir-spruce forests 23 species, of larch forests 21 species, and of pine forests 19 species. In the belt of high mountain plants, represented by the alpine tundra and forest tundra 16 species of lady beetles were found. Depauperate fauna is characteristic of a cultivated landscape, but at the same time some species increase sharply.

## References

- BELICEK, J., 1976. Coccinellidae of Western Canada and Alaska with analyses of the transmountane zoogeographic relationship between the fauna of British Columbia and Alberta (Insecta: Coleoptera: Coccinellidae). *Quaest. Ent.* **12** (4): 283–396.

- BIELAWSKI, R., 1984. Coccinellidae (Coleoptera) of Mongolia. *Ann. zool. W.*, **38** (14): 281–460.
- GORDON, R. D., 1985. The Coccinellidae of America North of Mexico. *J. New York Ent. Soc.* **93**. N 1. 912 pp.
- HOANG, D. N., 1982. Coccinellidae of Vietnam (Insecta, Coleoptera). Part 1. Hanoi, 211 pp. [in Vietnamese].
- KUZNETSOV, V. N., 1993. Coccinellid beetles (Coleoptera, Coccinellidae) of the Russian Far East. Parts 1 & 2. Vladivostok, 334 pp. [In Russian].
- 1997. Lady beetles of the Russian Far East. Center for Systematic Entomology. Gainesville. 248 pp.
- & N., ZAKHAROV, E. V., 2000. The peculiarity of the coccinellid (Coleoptera) fauna of the Kamchatka Peninsula. *Nat. Hist. Res. Spec. Issue*. No. 7: 119–129.
- PANG X.-F., MAO J. L., 1979. Fauna of economic insects of China (Coleoptera: Coccinellidae) II. Beijing, 170 pp. [in Chinese].
- PARK, H. C., 1993. Systematics and Ecology of Coccinellidae (Insecta: Coleoptera) in Korea. Seoul. 299 p. [In Korean].
- SASAJI, H., 1971. Fauna Japonica. Coccinellidae (Insecta: Coleoptera). Tokyo. 345 pp.
- YU G.-Y., WANG, H. Y., 1999. Guidebook to lady beetles of Taiwan. 231 pp.