

## STUDY ON MORPHOLOGICAL CHARACTERISTICS OF LADYBIRD BEETLES (COLEOPTERA: COCCINELLIDAE) AND THEIR HOST-PLANTS IN JOENSUU, FINLAND

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### ABSTRACT

The survey of the ladybird beetles population was conducted in Joensuu area, Finland, over a period of three years from mid-May 2010 to mid-August 2013. All the specimens of the coccinellid ladybird beetles were collected from five major localities: City centre, Linnunlahti, Karsikko, Utra and Pilkko areas. In the family Coccinellidae, 16 species belonging to 10 genera were found in our experiment time. Most of ladybird's common host-plant was *Rosa rugosa* and also other different species of plants. All the host-plants were growing naturally in the local ecosystem of the experimental area. Out of the 16 species of ladybird beetles from Joensuu, there were two species (*Cryptolaemus montrouzieri* and *Chilocorus stigma*) reported for the first time from North Karelia and is therefore, a new addition to the ladybird beetles fauna of Finland.

**Key words:** Coccinellidae, genera, ladybird, species, sub-family, specimens

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### INTRODUCTION

Ladybird beetles (Coleoptera: Coccinellidae) are insects commonly found across the globe and can be considered more or less worldwide in distribution. In the new world, humans appear, directly or indirectly responsible for all or most ladybird invasions (Edward *et al.*, 2011). They belong to family Coccinellidae which include insects living in warm habitats and very active on sunny days. Vandenberg (2000) reported that, about 6000 species of these beetles have been recorded worldwide while Linnaeus (1758) had described 36 beetle species from Europe from the genus *Coccinella*. In the old records Redtenbacher (1843) had divided ladybird beetles into two groups, one of which is aphidophagous and the other phytophagous. The predatory species of the ladybird beetles larvae and adults feed on almost 39 species, including aphids, scale insects, thrips, white-flies, leafhoppers, mealybugs, mites as well as other small soft-bodied species and their small eggs (Iperti and Paoletti, 1999; Gautam, 1989; Moreton, 1969). Shah (1985) recorded that, approximately 4200

species of coccinellids are considered beneficial because of their predatory activity, mainly against the homopterous insects (aphids and scale insects) and phytophagous mites, which are harmful to various forest and agricultural plants. Also Abbas *et al.* (2013) reported that, agricultural crops and their associated weeds comprising of a variety coccinellids species, which are better control agents of insect pests. There are many reasons for the growing popularity of the ladybird beetles for human beings. Most of the ladybird beetles possess bright colour patterns (Ullah, *et al.*, 2012) and their black or other coloured spots are the main reasons for their attraction for people. Ladybird beetles are briefly active in the Joensuu area between the middle of May to middle of August, because of the short summer and warm sunny days. Some ladybird species are found at the end of August and also until middle of September too (e.g.: *Propylea quatuordecimpunctata* L.) which depend on aphids for food or warm temperature. Adult ladybirds hibernate in the cold winters until the following summer. During the winter they shelter in tree holes, natural hiding places (Majerus and Kearns, 1989), and also under the tree barks, building corners, windows or corners of verandas. Our research work

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was conducted in Joensuu city, located in the North-Karelia region, Finland. After 1975, no new record of morphology on the population of the ladybird beetle species and their host-plant varieties has been done earlier in these regions. The objectives of the present study are: 1) To document the coccinellid species of the ladybird beetles available in Joensuu city; 2) to record their distribution and short summer seasonal occurrence; 3) to describe their general morphological characteristics to enable the identification of some new ladybird species recorded; and 4) to create an awareness among the local inhabitants on the importance of ladybird beetles as an effective biological pest control for crop protection.

## MATERIALS AND METHODS

The research study was conducted in the Joensuu city over the summer season in the months of mid-May to mid-August, between 2010 and 2013. The research area covered in the Joensuu, North Finland is located at 62°36'N and 029°45'E. The city covers almost 2,751.07 square kilometres in area which the land area is 2,381.76 square kilometres and the water area 369.31 is square kilometres. The River Pielisen flows through the city and many lakes are also present affording a suitable environment for the ladybirds. The city experiences extreme climates, with the temperature in summer reaching a maximum of (+35°C) and a maximum winter temperature of (-30°C).

### Study areas of sample collections

The study area was divided into five sampling regions: Joensuu city centre, Linnunlahti, Karsikko,

Utra and Pilkko areas for collection of the ladybird beetles (Fig. 1). Most of the collection was done three times in a week during sunny and warm weather where there was a possibility of finding the ladybird beetles. To collect the ladybird beetles we used the methods of hand-picking, sweeping hand nets, made with mosquito netting, glass bottles for the ladybirds thus collected, boots, sunglasses, plastic bags, cotton moistened with water, and cameras for natural photographs record the ladybird beetle activities. Samples were then collected three times in a week and each day involved three hours of collection time. Each specimen was properly labelled recording the date of collection, the place of collection and the specific host-plants.

### Laboratory experiments

All the specimens were carefully handled, avoiding any kind of damage. The specimens collected were preserved in Petri dishes or glass vials and maintained in the Research and Teaching Laboratory of Applied Botany, Department of Biology, University of Eastern Finland.

### Measurements of plants and ladybirds

The data collected were statistically analysed using the Sigma Plot 11.0 statistical program as well as the general graph program. For photographs, we used the USB Microscope (20x–350x) Digital 'BRESSER' Germany; 'OLYMPUS' digital YYY Micro camera; Cannon 'DIGITAL IXUS' 8015 and for observation of the different parts of the ladybird beetles we used the laboratory microscope Carl Zeiss, Göttingen, Germany. The size of the ladybird beetles was measured with digital calipers 'RAWLINK' scale using the electronic reader with up to 0.00 mm accuracy. The specimens collected



Fig. 1. Ladybird beetles collection area in the Joensuu region.

were identified referring to the latest literature available as well as the following books 'European Insect Guide' by Chinery M. (1993); Biström *et al.* (2001) Journal and 'World Flowers' by Polunin O and Polunin L. (1988).

## RESULTS

In total 361 specimens belonging to 10 genera of the Coccinellidae family, which represented 16 species of ladybird beetles were collected during the study period, 2010–2013 (Table 1). During the collection period several different ladybird species

were found inhabiting different host-plants (Table 2). *Adalia bipunctata* and *Propylea quatuordecimpunctata* were collected from all the locations selected. *Adalia* was found to be most abundant genus (n=266) in the collection period. Genus *Propylea* was the second most abundant (n=42) ladybird beetle with a single species in the collection period. There were five species of ladybirds abundant from genus *Coccinellae* which were the third most abundant (n=20) species. On the other hand, eight genera was represented by a single species; *Anatis ocellata* (n=2), *Calvia quatuordecimguttata* (n=3), *Cryptolaemus montrouzieri* [(n=7) new], *Hippodamia*

**Table 1.** Ladybird beetles (Coleoptera: Coccinellidae) found in the Joensuu fauna throughout sampling period 2010 – 2013

Order	Family	Genus	Species	Total	Collecting months
Coleoptera	Coccinellidae	<i>Adalia</i>	<i>A. bipunctata</i> L.	266	May, June, July
		(melanic)	<i>A. sexpustulata</i> L.	3	June, July
		(melanic)	<i>A. quadrimaculata</i> L.	3	May, June, July
		<i>Anatis</i>	<i>A. ocellata</i> L.	2	June, July
		<i>Coccinella</i>	<i>C. septempunctata</i> L.	9	May, June, July
			<i>C. trifasciata</i> L.	1	June
			<i>C. undecimpunctata</i> L.	6	June, July
			<i>C. hieroglyphica</i> L.	1	June
			<i>C. quinquepunctata</i> L.	3	June, July
		<i>Calvia</i>	<i>C. quatuordecimguttata</i> L.	3	June, July
		<i>Cryptolaemus</i>	<i>C. montrouzieri</i> L.	8	June, July, August
		<i>Chilocorus</i>	<i>C. stigma</i> L.	1	July, August
		<i>Halyzia</i>	<i>H. sedecimguttata</i> L.	7	June, July
		<i>Hippodamia</i>	<i>H. tredecimpunctata</i> L.	1	June, July
		<i>Propylea</i>	<i>P. quatuordecimpunctata</i> L.	42	May, June, July, August
		<i>Psyllobora</i>	<i>P. vigintiduopunctata</i> L.	11	June, July, August
	n=10	n=16	n=361		

**Table 2.** Observation of ladybird beetles and host-plants species in the Joensuu area

Ladybirds	Host-plants species
<i>Adalia bipunctata</i>	<i>Rosa rugosa</i> L.; <i>Salix caprea</i> L.; <i>Salix triandra</i> L.; <i>Phaseolus vulgaris</i> L.; <i>Phaseolus lunatus</i> L.
<i>Adalia quadrimaculata</i>	<i>Rosa rugosa</i> L.; <i>Salix caprea</i> L.
<i>Adalia sexpustulata</i>	<i>Rosa rugosa</i> L.; <i>Salix triandra</i> L.
<i>Anatis ocellata</i>	<i>Rosa rugosa</i> L.; <i>Pinus silvestris</i> L.
<i>Coccinella septempunctata</i>	<i>Rosa rugosa</i> L.; <i>Phaseolus vulgaris</i> L.; <i>Phaseolus lunatus</i> L.
<i>Coccinella undecimpunctata</i>	<i>Rosa rugosa</i> L.; <i>Phaseolus vulgaris</i> L.
<i>Coccinella quinquepunctata</i>	<i>Rosa rugosa</i> L.; <i>Phaseolus lunatus</i> L.
<i>Coccinella trifasciata</i>	<i>Rosa rugosa</i> L.
<i>Calvia quatuordecimguttata</i>	<i>Salix triandra</i> L.; <i>Rosa rugosa</i> L.
<i>Cryptolaemus montrouzieri</i>	<i>Phaseolus vulgaris</i> L.; <i>Stevia rebaudiana</i> L.; <i>Amaranthus caudatus</i> L.
<i>Hippodamia tredecimpunctata</i>	<i>Solanum tuberosum</i> L.
<i>Halyzia sedecimguttata</i>	<i>Rosa rugosa</i> L.
<i>Propylea quatuordecimpunctata</i>	<i>Trollius europaeus</i> L.; <i>Salix appendiculata</i> L.; <i>Rosa rugosa</i> L.; <i>Vicia sepium</i> L.; <i>Phaseolus vulgaris</i> L.; <i>Actaea erythrocarpa</i> L.; <i>Tanacetum vulgare</i> L.
<i>Psyllobora vigintiduopunctata</i>	<i>Trollius europaeus</i> L.; <i>Vicia sepium</i> L.; <i>Clematis sibirica</i> L.
<i>Chilocorus stigma</i>	<i>Zea mays</i> L.

**Table 3.** A brief glance of the morphological characteristics of the ladybird beetles collected

Ladybird beetles	Elytra	Pronotum	Legs	Thorax	Abdomen	Spots	Scutellum
<i>Anatis ocellata</i>	Reddish brown	Dark black	Brownish black	Black	Black	Eight spots with eyes mark	Yes
<i>Adalia bipunctata</i>	Orange	Yellowish with black	Black	Black	Black	One black spot	No
<i>Adalia quadrimaculata</i>	Blackish red	Black	Dark brown	Dark brown	Dark brown	Four reddish Spots	No
<i>Adalia sexpustulata</i>	Reddish black	Black	Deep black	Deep black	Deep black	Six reddish spots	No
<i>Coccinella hieroglyphica</i>	Light orange	Dark brown, orange mark	Black	Black	Black	Three black spots	No
<i>Coccinella septempunctata</i>	Bright orange	Black with brown spot	Deep black	Deep black	Deep black	Seven black spots	Yes
<i>Coccinellatrifasciata</i>	Orange	Black with brown spot	Deep black	Deep black	Deep black	Six big bands	No
<i>Coccinella undecimpunctata</i>	Light yellow	Black with yellow line	Brown & black	Black	Black	Eleven black spots	Yes
<i>Coccinella quinquepunctata</i>	Red	Black with yellow marking	Deep black	Deep black	Deep black	Five black spots	Yes
<i>Calvia quatuordecimguttata</i>	Brownish, brown	Glossy with creamy spot	Brown	Black	Brownish black	Fourteen creamy spots	No
<i>Cryptolaemus montrouzieri</i>	Velvety black	Shining reddish	Brown	Black	Deep orange	Only reddish hairs	No
<i>Hippodamia tredecimpunctata</i>	Red, deep orange	Yellowish black, spot	Dark brown	Deep brown	Deep brown	Thirteen black spots	Yes
<i>Halysia sedecimguttata</i>	Orange	Yellowish or orange	Orange	Yellow	Yellow	Sixteen creamy white spots	No
<i>Propylea quatuordecimpunctata</i>	Yellowish, orange	Pale yellow, black marks	Brown	Deep brown	Deep brown	Fourteen unmarked black spots	No
<i>Psyllobora vigintiduopunctata</i>	Bright yellowish	Yellowish	Brownish	Glance black	Glance black	Twenty two black spots	No
<i>Chilocorus stigma</i>	Shining black	Dark black	Black	Black	Reddish, yellowish	Two red spots	No

*tredecimpunctata* (n=1), *Halysia sedecimguttata* (n=7), *Psyllobora vigintiduopunctata* (n=12) and *Chilocorus stigma* [(n=1) new] as follows (Fig. 3). In the laboratory experiment, we found clear and theoretical evidence about the morphological character in each genus and species of the ladybird beetles collected (Table 3).

## DISCUSSION

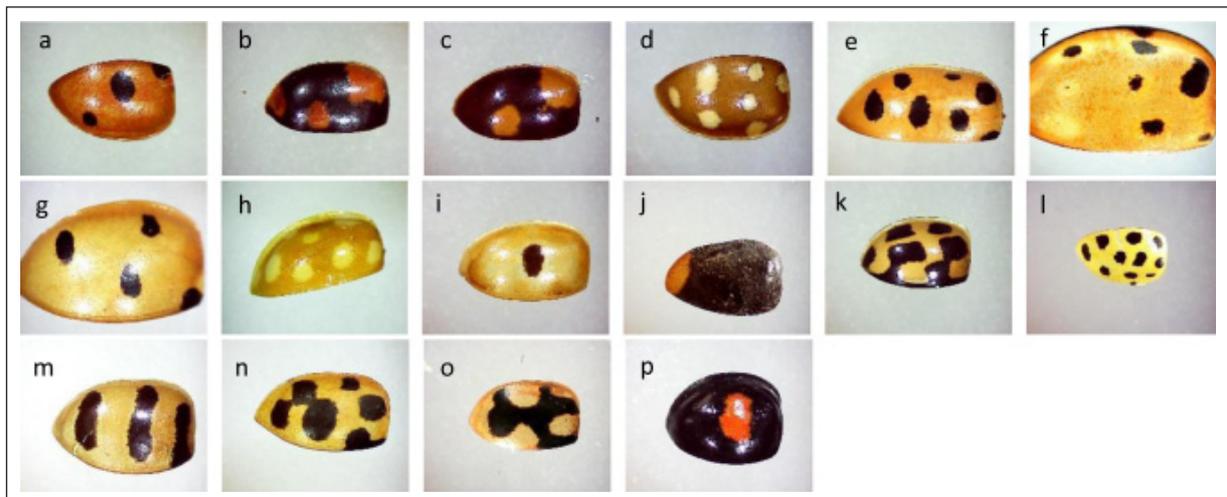
*Coccinella quinquepunctata* adults are the commonly called the 'five spotted ladybird beetles'. The adult body colours are red with five black spots on the elytra. The body is 4.88mm long and 3.63mm wide. Each elytron has one big black spot in the

centre and one small black spot on the lower side corner. Near the pronotum a 'scutellary' or a big black spot is seen on both elytra. The pronotum is fully black but near the head, both corners of the pronotum have small yellowish markings. The legs, thorax and abdomen are deep black (Fig. 2A, a). Ecologically they are aphid feeding ladybird beetles. During the study period the following ladybirds were found in the wild rose host-plant in the Karsikko and city centre areas. *Adalia sexpustulata* adults are melanic ladybird beetles with the *Adalia bipunctata* species. The adult body size is 5.38mm

long and 3.70mm wide and red in colour. The elytra bears six reddish spots or marks. Each elytron carries three spots or marks, of which the first one is the largest in size, located in the corner; the middle one is bigger than the third one which at the end of the elytron. The pronotum is fully black and without any marks. Legs, thorax and abdomen are deep black (Fig. 2B, b). Ecologically they are aphidophagous ladybird beetles. During the study period they were found in the wild rose host-plant, small willow plants and their distribution was in the Karsikko and City centre areas. *Adalia quadrimaculata*



**Fig. 2.** (A) *Coccinella quinquepunctata* (B) *Adalia sexpustulata* (C) *Adalia quadrimaculata* (D) *Calvia quatuordecimguttata* (E) *Hippodamia tredecimpunctata* (F) *Anatis ocellata* (G) *Coccinella septempunctata* (H) *Halysia sedecimguttata* (I) *Adalia bipunctata* (J) *Cryptolaemus montrouzieri* (K) *Propylea quatuordecimpunctata* (L) *Psyllobora vigintiduopunctata* (M) *Coccinella trifasciata* (N) *Coccinella undecimpunctata* (O) *Coccinella hieroglyphica* (P) *Chilocorus stigma*.



**[Fig. 2.** (a) *Coccinella quinquepunctata* (b) *Adalia sexpustulata* (c) *Adalia quadrimaculata* (d) *Calvia quatuordecimguttata* (e) *Hippodamia tredecimpunctata* (f) *Anatis ocellata* (g) *Coccinella septempunctata* (h) *Halysia sedecimguttata* (i) *Adalia bipunctata* (j) *Cryptolaemus montrouzieri* (k) *Propylea quatuordecimpunctata* (l) *Psyllobora vigintiduopunctata* (m) *Coccinella trifasciata* (n) *Coccinella undecimpunctata* (o) *Coccinella hieroglyphica* (p) *Chilocorus stigma*].

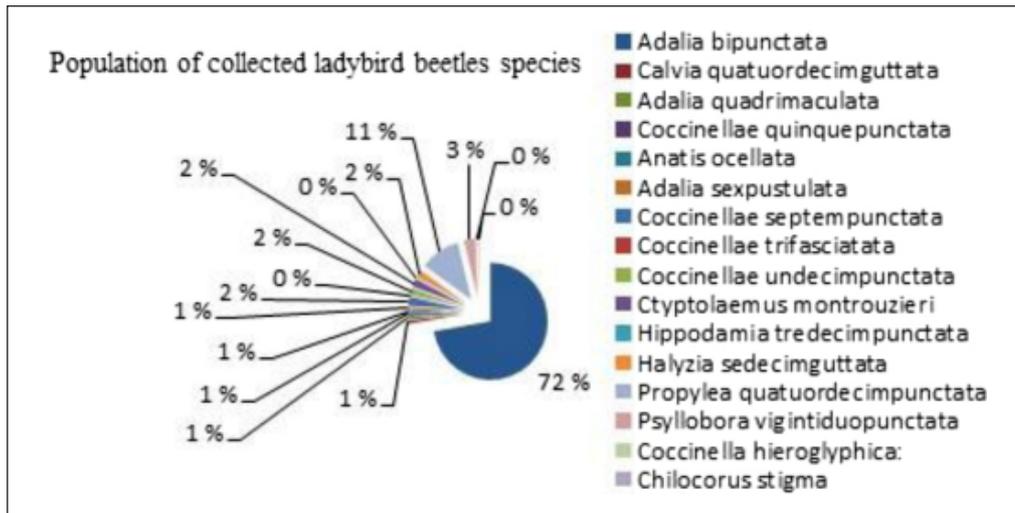


Fig. 3. The total number of collecting ladybird beetles during the period 2010–2013 in the Joensuu area.

adults are commonly known as the melanic forms (*A. bipunctata* L.) or shining ladybird beetle. Brakefield (1984a) described the melanic morphs as having black elytra and those with four red spots are the *Adalia quadrimaculata* ladybird beetle. The adult body is black in colour with red and is 4.63mm long and 3.20mm wide. Their elytra are black bearing four reddish spots or marks. Each elytron carries two spots, with one small spot in the middle and the other large sized one in the upper side corner. The pronotum is black, while the legs, thorax and abdomen are dark brown or black in colour (Fig. 2C, c). Ecologically they like to eat wild rose aphids and tender young willow aphids. During the study period they were found in two different collection areas, Joensuu city centre and Karsikko. The *Calvia quatuordecimguttata* adult ladybird beetles commonly found in nature, have 14 cream spots. Biström *et al.* (2001) described the same genus, but a different species *C. quindecimguttata* (Fab.) which appears to be a declining species in Finland. The adult body length is 5.12mm and width is 3.74mm. It is oval in form and weakly convex. Normally their body is brownish or brown in colour. Their elytra colouration varies with the natural habitat. The shape and size of the cream spots also vary, whereas the upper spots are smaller than the lower spots and the spots arrangement normally include a straight line of six spots across both elytra. The pronotum is glossy and both corners of the pronotum have small creamy spots. The legs are brown, the thorax is black and the abdomen is black on the upper side, but brown on the lower side (Fig. 2D, d). Ecologically they are found on deciduous trees and bushes where they and their larvae feed on soft-bodied insects such as psyllids and aphids. They are feed on psyllids to promote faster larval development, especially *Cacopsylla*

*mali* (Ijaz, D. 2013). There are many Aphididae species that have been identified as an essential food for *Calvia quatuordecimguttata*: *Chaitophorus tremulae*, *Cavariella konoi*, *Aphis farinose*, *Eucalipterus tiliae*, *Euceraphis betulae*, and *Macrosiphoniella artemisiae* (Gordon, 1985; Kalushkov and Hodek, 2001). During the study period they were found in the Utra area with their preferred prey, the aphid's host-plants wild rose and small willow plants. *Hippodamia tredecimpunctata* are commonly known as 13-spotted ladybirds, with deep orange to red coloured elytra. Adult body length is 6.75mm and width is 4.38mm. They are mainly oval in shape as adults with dome-like backs. Sometimes they are shiny with short legs and with antennae. Each elytron has six dark black spots and one small sized black 'scutellum spot' near the pronotum, which is shared on both elytra. Three black spots are larger in size than the other three spots. One-third of the pronotum 1/3 space is covered with black marks, but both corners have two small black spots, light yellow in colour. The legs are dark brown, whereas the thorax and abdomen are deep brown (Fig. 2E, e). Ecologically they were found in the areas of wild vegetation where green grass and legume plant species abounded. During the study period they were found only in one area selected for the study. The ladybirds were found in Pilkko where the inhabitants cultivate small gardens. The adults were found to eat the potato infesting aphids (Vaundell, and Storch, 1972). The *Anatis ocellata* ladybird beetles were largest in size among the spotted ladybird species collected in all. The adult body length 8.5mm and width is 6.3mm. The elytra are reddish brown in colour with black-eyed spotted marking. Each elytron has eight eye-spots whereas others have 2–6 black spots, the others spots being the only eye marking. The first

and last black spots are bigger in size than all the other spots and each spot is surrounded by a yellowish halo ring. One black spot on the scutellum called 'scutellary spot' is also surrounded by an eye mark. The pronotum is dark black with five white spots. The legs are light brown or black in colour, thorax and abdomen are fully deep black (Fig. 2F, f). Ecologically they prefer the pine aphids (Family, Adelgidae), and are attracted to the scent of the pine (Kalushkov and Hodek, 2001). Adults also eat other aphid species like the wild rose aphids. During the study period they were found only in the Utra area where the wild rose host-plant is available. *Coccinella septempunctata* is one of the big sized spotted coccinellid ladybird beetles. The body colour is bright orange and oval in shape and is 7.24mm long and 5.50mm wide. They have three large sized black spots on each elytron, where one black spot is in the middle of the elytron and the other two are in the side corners of the elytra. The middle black spots are bigger than the other two black spots. The 'scutellary spot' is shared between both elytra near the pronotum. The pronotum has big and black in colour and both sides of the pronotum near eyes brown spots. The legs, thorax and abdomen are fully deep black in colour (Fig. 2G, g). Ecologically they were found on their common host plants wherever aphids are available. Usually they feed on the pea aphids, but also eat other aphids and scale insects. During the study period they were found in all the five collection areas mentioned on the wild rose host-plant. *Halyzia sedecimguttata* are common 16 creamy-white spotted ladybird beetles. The adult has an oval body shape and every part is bright orange in colour. Their body length is 5.89mm and width is 4.50mm. Each elytron has four creamy-white spots which are bigger in size than the other spots. They are normally found in cool habitats and commonly active on the available food source like aphids. The pronotum is yellow or orange in colour without marks. The legs, thorax and abdomen are fully orange or yellowish and their whole body colour is orange or yellowish (Fig. 2H, h). Ecologically they are found in the wild rose aphid host-plant. During the study period they were found in the Utra and Joensuu city areas with their host-plants. *Adalia bipunctata* adult is a two-spotted ladybird beetle common in Finland. The body length on average is 5.13mm and width is 4.35mm with an ovoid body shape that shines body in the light. The elytron is orange in colour with one black spot in the middle. They are also a polymorphic species, Palearctic and Nearctic in distribution, occurring in many forms, ranging from red to black in colour (Omkar and Pervez, 2005). The pronotum has black marks in the middle but both the side corners and areas near the scutellum are yellowish. The legs, thorax and

abdomen are black in colour (Fig. 2I, i). Zakharov (2003) reported that, the European and North Asian populations of *A. bipunctata* contain 5–10% melanics (black individuals) with high percentages (60–80%) in Rome (Italy), Marseilles (France), St. Petersburg, Vologda (Russia), Yalta (Ukraine) and Yerevan (Armenia). Ecologically *A. bipunctata* is a polyphagous species with a wide range of aphid prey. During the period of study it was found that they preferred aphid prey included wild rose leaf aphids, legume bean aphids and a different species of willow aphids. Therefore, *A. bipunctata* is of very great economic importance in agricultural biology. The *Cryptolaemus montrouzieri* ladybird species was a new collection during this period, because of the velvety black hair on the body. The adult ladybird beetles have a body length of 4.7mm and width of 3.3mm. The body is shining and completely different from the normal spotted ladybird beetles. They have a narrow reddish hair band at the end of both elytra. The pronotum is fully covered with reddish hair and is shining in nature. The prosternum is light orange in colour, while the eyes are black, antennae light brown, legs deep brown and tarsus has a narrow reddish mark. The thorax is black, but the abdomen is deep orange in colour (Fig. 2J, j). Ecologically they found on Red-tail and legume as host-plants. They normally feed on scale insects and aphids. Raupp *et al.* (1993) described the *C. montrouzieri* adult as also eating mealybugs. During the study period they were found on the garden *Phaseolus* spp. host plant in the Utra and *Amaranthus* spp. in the Linnunlahti areas. *Propylea quatuordecimpunctata* species include the 14-spotted medium sized ladybird beetles. Adults are 3.8–4.5 mm long and 2.8–3.9mm wide. They are the most aphidophagous ladybirds in ecology and active in nature entire summer. The elytron is light yellow to light orange in colour with 14 unmarked black spots, which almost look like rectangular spots. Usually the several black spots show larger markings in the midline elytron and they also resemble the shape of an anchor. The pronotum is pale yellow in colour with a big black band mark. They also sometimes have 4–6 small black spots fused together on the black marks. The legs are brown while the thorax and abdomen are deep brown (Fig. 2K, k). Ecologically they are aggressive aphid feeding polyphagous ladybird beetles. The adults and larvae ate their own eggs in the laboratory conditions. However, during the study period they were found in all the five collecting points in the Joensuu area in the different host-plants. The *Psyllobora vigintiduopunctata* adults were the brightest small yellowish ladybirds found in natural habitats. Their body length was on average 3.9mm and the width was 3.52mm. Both elytra always bears 22 black spots and almost all

the spots are of the same size. The pronotum is very thin, small and fully yellow in colour. In the pronotum, there are five black spots, of which three spots are bigger than the other two. The legs are brownish in colour with black marks; the thorax and abdomen are light black in colour (Fig. 2L, l). Ecologically they are aphid and scale insect eating ladybird beetles. Adults are actively finding aphids on their host-plant on worm or sunny days. They always move slowly on their host-plants from one side to the other side. During the study period they were found them on small wild host-plants in the Utra and Linnunlahti areas. The *Coccinella trifasciata* ladybird looks cross-banded orange in colour and oval in shape. The body length is 4.9 mm and width is 3.8 mm. They have three big black bands on both elytra whereas the first band joints the shape to look like one band. The second and third black bands are clearly separate in both elytra. The pronotum is big with a big black band and small brown spots near the head portion. The legs, thorax and abdomen are completely deep black in colour (Fig. 2M, m). Ecologically they are in the wild rose host-plants with aphids. During the study period they were found in the city centre area. The *Coccinella undecimpunctata* is also called 11-spotted ladybird beetle with a yellowish body. The adult body length is 5.3mm and the width is 4.7mm. Wheeler *et al.* (1981) reported that, *C. undecimpunctata* is an Old World aphid predator that occurs throughout much of Europe, Iceland, central Asia and Northern Africa. Both elytra are yellowish or light orange and carry ten black spots. Each elytron has three bigger black spots in the middle, middle corner and upper corner. One big black spot occurs on both elytra in the upper position and is funnel shaped, called the 'scutellary spot'. The pronotum is covered with black marks, but with a very narrow yellow line on the upper portion. The legs are brown with black, while the thorax and abdomen are black in colour (Fig. 2N, n). Ecologically they are found in the wild rose aphid host-plants. During the study period they were found in the small willow and wild rose plants in the Karsikko and city centre areas. The *Coccinella hieroglyphica* adult was variably marked and light orange in colour. The adult body length is 4.6mm and the width is 3.8mm. The elytra colour is light orange in colour on both sides and each elytron carries three big black spots of which one is the 'scutellary spot'. Those black spots are often fused each other, together making a big black mark on both elytra. The pronotum is dark brown with an orange mark in both corners. The legs, thorax and abdomen are black in colour (Fig. 2O, o). Ecologically they are aphid feeding ladybirds. During our observation period only one specimen was found on the host-plant in the Karsikko area.

The *Chilocorus stigma* adult is new found, oval shaped and shining black with two spots. The body length is 4.43mm and width is 3.47mm. The colour of the elytra is shining black or deep royal blue. Each elytron has one big reddish or deep orange spot on the middle position. The pronotum is black or deep blue without any marks. The legs are black with a small yellowish mark on the tarsus area; the thorax is black; the abdomen is reddish or deep orange in colour and the first abdominal segments have a big black mark (Fig. 2P, p). Ecologically they are found living in area of vegetation where green plants and scale insects are found. Gordon (1985) reported that, nearly all the species of the genus *Chilocorus* are predacious on scale insects, although some will accept aphids or adelgids as prey. During the study period they were found in corn host-plant and their area of distribution was the Linnunlahti collection spot.

Most of the Ladybird beetle species are ecologically important to the Agro-ecosystem for their role as an effective biological pest control. About 90% of the ladybirds are insects beneficial to agriculture, as they act as effective biological pest controls. Therefore, the ladybird beetles are best known as beneficial insects in biological ecology. It is known that, every year's many crops or crop related plants are damaged by different aphid species. This necessitates the increased use of pesticides in the crop fields which destroys the animal food chain, causes pollution and several other hazards. After further experimentation with aphidophagous ladybird beetles they can easily be used in crop protection. If we succeed, then the economy and the environment will develop. Also, by the artificial culture of the ladybird beetles and larvae with their attractive colours, beautiful shapes, different coloured spots and their natural importance, it is possible to set up indoor 'Ladybird Beetles Eco-Parks' to gain a basic knowledge, as well as for public study and research.

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The ladybird beetles female genitalia consist of an ovipositor which is formed by the appendages of abdominal segments 8 and 9. The external genitalia of the male is extremely variable in the ladybird beetles, but it is often quite complex and they are frequently of considerable taxonomic value of identification.Â Different species of ladybird beetles abdomen structure may have a big role in reproduction and also for host-plant selection to lay eggs.Â 7. Ponsonby DJ, Copland JW (1997) Predators Coccinellidae and other Coleoptera. pp. 29â€“60 in Ben-Dov, Y. & Hodgson, C.J. (eds): Soft Scale Insects, their Biology, Natural Enemies and Control. Amsterdam: Elsevier. 8. Dixon AFG (2000) Insect Predator-Prey Dynamics. The ladybird beetles belong to family Coccinellidae. The family Coccinellidae is placed in the superfamily Cucujoidea, series Cucujiformia within the suborder Polyphaga and order Coleopteran.Â Ladybird beetles lay their eggs on the leaves, stems and sometimes on the bark of plants often near prey. The eggs of most species are long, usually oval and vary from a light yellow to a deep orange color.Â Results and discussion. During the present study on the identification and distribution of Coccinellid fauna of District Dir Lower, a total number of 510 specimens of Coccinellid beetles were collected from four localities of the district. These include 255, 160, 50 and 45 species from Maidan, Jandool, Timergara and Adenzai, respectively.