Simple Summary: This study describes how simple traps can be used to study tree crowns and undergrowth at low altitudes. They are used with the bait of fermenting liquids (beer, wine) with the addition of sugar and other carbohydrates. The research was conducted in 2018-2020 in several regions of Russia. It was possible to identify 294 species from 45 Coleoptera families during this time. Simple traps have been shown to be highly effective and can be used to study insect biodiversity in forest ecosystems.

Abstract: The possibilities of applying various methods to study Coleoptera give unexpected and original results. The studies were carried out with the help of fermental crown traps in 2018-2020 on the territory of eight regions in the central part of European Russia. The biodiversity of Coleoptera that fall into crown traps includes 294 species from 45 families. The number of species attracted to the fermenting bait is about a third of the total number of species in the traps (this is 97.4% of the number of all caught specimens). The largest number of species that have been found in traps belong to the families Cerambycidae, Elateridae and Curculionidae. The most actively attracted species mainly belong to the families Cerambycidae, Nitidulidae and Scarabaeidae. Species of these families are equally attracted by baits made of beer, white and red wines. To identify the Coleoptera biodiversity of a particular biotope, two-year studies are sufficient, which should be carried out throughout the vegetation season. Especially good results can be obtained from studies of rare species that are actively attracted by such baits. It is possible to study the vertical-horizontal distribution of Coleoptera fauna in individual biotopes.

Keywords: fermental traps, beer traps, Coleoptera, fauna, biodiversity, occurrence.

1. Introduction

Forests are biologically diverse ecosystems that represent some of the richest communities of living organisms on Earth. Due to the diversity of these ecosystems, they are home to a significant species and diversity of insects [1,2,3,4,5,6,7,8]. While many insect species thrive, some forest species are on the verge of extinction due to forest degradation, pollution, fragmentation, changes in tree composition, climate change, and other factors, such as fires, tree felling, and draining [9,10,11,12,13,14,15,16]. The species diversity of Coleoptera forest ecosystems is very large, and knowledge about this biodiversity is constantly being updated through the use of a wide variety of studying methods [17,18,19,20,21,22].

Entomological net mowing, window traps, pitfall trap, light trap, and Malaise trap are key methods for studying Coleoptera biodiversity in forest systems [23,24,25,26,27,28]. Most of these methods are easy to use and therefore a huge number of studies are based on these research methods. At the same time, these methods are usually used at the level of human growth. These methods are quite accessible and are actively used to study insects of the soil and herbaceous tiers, as well as to a certain extent shrubs.
and undergrowth. In open ecosystems, such as grasslands, steppes, and deserts, these methods are sufficient to study biodiversity [29,30,31,32].

However, these methods do not always accurately assess the biodiversity of Coleoptera in individual forest areas or in specific forest tiers. This is especially true for the study of the upper tiers of the forest, which are often inaccessible to the entomologist with a net. Some collection methods are quite labor-intensive and are therefore rarely used by entomologists. Fermental crown traps with various baits are an additional and well-established method of studying the biodiversity of Coleoptera in the forest canopy [33]. Bait trapping for insects is discussed in many general entomological texts, and ranges from techniques such as ‘sugaring’ and pheromone traps to using ‘natural’ organic baits such as carrion and dung [34]. Traps with baits made of fermenting liquids, such as wine, molasses, beer, with the addition of bananas, apples, sugar and other natural fillers have proven effective in detecting many Coleoptera families [35,36,37,38,39,40,41,42,43]. Previously, a mixture of beer with sugar, honey and jam was successfully used as bait [44,45,46]. Using such original and unusual collection methods, it is possible to find new species not only for the region, but also for science [47, 48]. This study presents the results of studying Coleoptera using fermental crown traps in various regions of Central Russia and the Volga region.
2. Materials and Methods

2.1. Placement of traps

The traps are a plastic 5-liter container with a window cut out in it on one side at a
distance of 10 cm from the bottom. With the help of a load, a rope with a tied trap was
thrown onto a tree branch at a height of 5 to 12 m from the soil surface [46, 49]. As bait,
fermenting beer, white and red dry wine was used with an addition in the form of honey,
jam or sugar.

The traps were placed in eight regions: the Republic of Mordovia, Tambov, Saratov,
Ryazan, Vladimir, Nizhny Novgorod, Ulyanovsk, and Penza regions in 2018 (from June
to August), in 2019 (from April to October) and in 2020 (from April to October). The
volume of material for this article is presented in Table 1.

| Region              | 2018  | 2019  | 2020  | Total |
|---------------------|-------|-------|-------|-------|
| Republic of Mordovia| 1750  | 10617 | 10901 | 23268 |
| Penza region        | 0     | 18    | 86    | 104   |
| Ulyanovsk region    | 0     | 20    | 32    | 52    |
| Nizhny Novgorod region| 0       | 13  | 29    | 42    |
| Vladimir region     | 0     | 0     | 21    | 21    |
| Ryazan region       | 0     | 0     | 19    | 19    |
| Saratov region      | 0     | 0     | 4     | 4     |
| Tambov region       | 0     | 0     | 3     | 3     |
| Total               | 83    | 317   | 420   | 820   |

Table 1. The quantity of the collected material in the regions of Russia*.

* – there is the number of traps installed above the line, there is the number of rec-
corded beetle samples below the line.

2.2. Usage of attractive liquids

In several series of experiments, the most attractive liquids for Coleoptera were de-
termined. The attractive liquids were white wine, red wine, and beer. The attraction
mixture consisted of these liquids, with or without added sugar. The following variants
of mixtures were studied:

1) beer with sugar (BS),
2) beer without sugar (B),
3) red wine with sugar (RvS),
4) red wine without sugar (Rv),
5) white wine with sugar (WvS),
6) white wine without sugar (Wv).
These experiments were carried out from April to August (they were repeated 10 times). All traps in each series of experiments were located on oak trees at the same height (5.5-6 m) at a close distance from each other (no more than 10-15 m). Each repetition of the experiment (exposure) is carried out for 7-10 days. Each repetition was carried out within one biotope (on an area of no more than 500 m²).

2.3. Calculations and used terms

Several terms were used to determine the effectiveness of traps. Occurrence – the ratio of the number of samples where a species (taxonomic group) is present to the total number of samples (expressed in %). Exposure time – the period between hanging a trap and taking samples for analysis (expressed in days). Bait – a liquid that attracts insects, located in a trap and it consists of various mixtures (beer, wine, water) and natural fillers such as solid and liquid food additives (sugar, honey, jam).

2.4. Format

The classification of the family-group taxa used in this checklist follows predominantly Bouchard et al. [50], with subsequent additions [51]. Changes from the Catalog of Palaearctic Coleoptera are taken into account [52,53,54,55,56,57,58], as well as data on the Cucujidea from the article by Robertson et al. [59], and Curculionoidea from the publication of Alonso-Zarazaga et al. [60]. To clarify the nomenclature, the cited articles were used, as well as the Catalog of Palaearctic Coleoptera [61,62]. Years of description of some species are specified by Bousquet [63].

3. Results

During the experiments in 2018-2020, more than 33,000 Coleoptera (Appendix A) specimens fell into our traps. In total, 294 species from 45 families were recorded in the traps (Fig. 1). About 1,500 specimens could not be identified to the species (mainly from the families Staphylinidae and Nitidulidae).

The largest number of species that were found in the traps belongs to the family Cerambycidae (57 species), Elateridae (33 species) and Curculionidae (31 species). However, the overwhelming number of families were represented in our catches by single species: only one species was recorded among 14 families (Staphylinidae, Hydrochidae, Monotomidae, Cucujidae, Lycidae, Brentidae, Atтелabidae, Aderidae, Lamiophloeidae, Boridae, Lymexylidae, Silvanidae, Mordellidae, Salpingidae), 2 species among 10 families (Erotylidae, Throscidae, Mycetophagidae, Scaptiidae, Pyrochroidae, Anthribidae, Cerylonidae, Melandryidae, Dytiscidae, Eucnemidae), 3 species among three families (Scirtidae, Latridiidae, Ptinidae).

Based on our long-term research, we can distinguish between species that are attracted by the mix, and random species that fall for some other random reasons (for example, they stumble on the transparent walls of the trap or fly to the water). In some cases, when installing a trap and its prolonged exposure, especially in sunny places, the processes of rotting of trapped insects can occur. This leads to the trapping of species that are attracted by carrion. We distinguish this group separately.
Thus, we conditionally distinguish 3 groups of Coleoptera species that fall into traps (Fig. 2). The number of species attracted by the mix was 29.6% of the total number of species in traps. However, they accounted for 97.4% of the number of samples that were identified. The average occurrence of these species exceeded the occurrence of random species by 21 times. The high occurrence of species that are attracted by carrion was noted. They probably react quickly enough to prey and fall into traps.

Figure 1. Distribution of families by the number of captured species in beer traps.

Figure 2. The ratio of the number of species, the number of specimens and the average occurrence of species, depending on the ability to attract to the bait.
As studies have shown (Fig. 3), the increase in the number of traps in the third year does not have the same effect as in the first two years. From 2018 to 2020, we increased the number of traps set for studying Coleoptera. We also increased the number of regions where these traps were located. It turned out that the number of species that fall into the traps increased significantly in the second year of the study with an increase in the number of traps. But in the third year of research, despite the higher number of traps, the number of new species that had not been caught before decreased. New species were trapped in 2020 due to an increase in the number of regions. Thus, in the third year, the number of new species caught in traps decreased. They already include random and/or very rare species that live in this biotope. It can be concluded that two-year studies will be sufficient to study the biodiversity of a particular biotope or a small region. We used several compositions of mixtures, in which the basis was red, white wine or beer. Sugar and yeast were added as additives to this bait.

![Figure 3. Dependence of the number of captured species on the number of traps by year.](image)

Fig. 4 shows the same direction of the effects of factors with some variance from Wv (above) to B (below all) for families and for species. It turned out that the number of Curculionidae specimens (mainly due to *Anisandrus dispar*) increases when catching white wine without sugar and to a lesser extent red wine without sugar. At the same time, the number of Nitidulidae specimens is not related to these factors, but their catchability increases with all other factors. As for the other families, they are all equally attracted to baits from different mixtures. Thus, the Dermestidae, Scarabaeidae, Staphylinidae, and Cerambycidae are similarly related to beer- and wine-based baits.
Figure 4. Canonical analysis of the number of registered specimens from different families depending on the bait composition (beer with sugar (BS), beer without sugar (B), red wine with sugar (RVs), red wine without sugar (Rv), white wine with sugar (WvS), white wine without sugar (Wv)). Families: Derm – Dermentidae, Scarab – Scarabaeidae, Staph – Staphylinidae, Nitid – Nitidulidae, Ceramb – Cerambycidae, Curcul – Curculionidae.

Figure 5 shows the number of recorded specimens of various species, depending on the composition of the bait. It turned out that Cryptarcha strigata is better caught using the largest number of mixtures (B, BS, WvS, RVs), while Wv and Rv attract Anisandrus dispar, Protaetia marmorata and Xyleborus saxesenii to a lesser extent. However, most of the studied species were almost equally lured by different mixtures.

Figure 5. Canonical analysis of the number of recorded specimens of various species, depending on the composition of the bait (see the caption to Figure 4). Species: A.schaef – Attagenus schaefferi (Dermestidae), P.marm – Protaetia marmorata (Scarabaeidae), D.marg – Dalopius marginatus (Elat eridae), C.strig – Cryptarcha strigata (Nitidulidae), G.hort – Glischrochilus hortensis (Nitidulidae),
Thus, the species composition of Coleoptera from fermental crown traps differs from those caught by other methods. Previously, such traps were recommended for use in the study of rare insect species [46]. For example, we present the results of the study of rare species of Coleoptera, which are included or recommended in the Red Books of some regions [6,64,65,66,67,68,69,70,71] and Red Data Book of Russia [72] (Table 2).

### Table 2. Occurrence of rare species (numbers indicate the number of rare species found in the region according to fermental crown trap records).

| Species                          | Red Data Book of Russia | Red Data Book                          |
|----------------------------------|-------------------------|----------------------------------------|
|                                  | Vladimir Region | Ryazan Region | Republic of Mordovia | Penza Region | Nizhny Novgorod Region | Ulyanovsk Region | Saratov Region | Tambov Region |
| Carabidae                        |               |               |                        |              |                        |                   |               |               |
| Lebia marginata (Geoffroy, 1785) | –            | –            | –                      | 1 (2)*       | –                      | –                 | –            |               |
| Staphylinidae                    |               |               |                        |              |                        |                   |               |               |
| Quedius dilatatus (Fabricius, 1787) | –          | –            | –                      | 57 (10)      | –                      | 10 (5)            | –            |               |
| Silphidae                        |               |               |                        |              |                        |                   |               |               |
| Dendroxena quadrimaculata (Scopoli, 1771) | –        | 0 (5)        | –                      | 10 (3)       | –                      | –                 | –            |               |
| Lucanidae                        |               |               |                        |              |                        |                   |               |               |
| Lucanus cervus (Linnaeus, 1758)  | +            | 0 (1)        | 0 (3)                  | 0 (25)       | 0 (2)                  | 3 (43)            | 0 (30)       | 0 (7)         |
| Scarabaeidae                     |               |               |                        |              |                        |                   |               |               |
| Gnorimus variabilis (Linnaeus, 1758) | –          | 0 (6)        | 0 (2)                  | 29 (6)       | 2 (6)                  | –                 | 0 (9)        | 0 (10)        | 0 (2)       |
| Osmothera barnabita Motschulsky, 1845 | +          | 0 (3)        | 0 (9)                  | 3 (4)        | 0 (7)                  | 0 (11)            | 0 (7)        | 0 (5)         | 0 (1)       |
| Protactia fieberi (Kraatz, 1880) | +            | 7 (4)        | 5 (–)                  | 125 (12)     | 48 (6)                 | 11 (–)            | 40 (–)       | 2 (9)         | 1 (–)       |
| Protactia marmorata (Fabricus, 1792) | –          | –            | 15 (7)                 | –            | –                      | –                 | –            | –             | –           |
| Protactia speciosissima (Scopoli, 1786) | +          | 2 (–)        | 1 (2)                  | 25 (8)       | 20 (11)                | 4 (1)             | 9 (25)       | 1 (14)        | 1 (4)       |
| Elateridae                       |               |               |                        |              |                        |                   |               |               |
| Elater ferrugineus Linnaeus, 1758 | +            | –            | –                      | 6 (2)        | –                      | –                 | 1 (–)        | 0 (1)         | –           |
| Coccinellidae                    |               |               |                        |              |                        |                   |               |               |
| Adalia bipunctata (Linnaeus, 1758) | –            | –            | –                      | 1 (4)        | –                      | –                 | –            | –             | –           |
| Cerambycidae                     |               |               |                        |              |                        |                   |               |               |
| Leptura thoracica (Creutzer, 1799) | –            | –            | 6 (2)                  | –            | –                      | –                 | –            | –             | –           |
| Purpuricenus globulicollis Dejean, 1839 | –          | –            | –                      | –            | 1 (1)                  | –                 | –            | –             | 0 (1)       |
| Purpuricenus kaehleri (Linnaeus, 1758) | –          | –            | 1 (1)                  | 31 (2)       | –                      | –                 | –            | –             | 1 (4)       |
| Necydalis major Linnaeus, 1758    | –            | –            | 0 (7)                  | 32 (8)       | –                      | –                 | –            | 0 (8)         | 0 (6)       |
| Leptura aurulenta Fabricius, 1793 | –            | –            | 3 (1)                  | –            | –                      | –                 | –            | –             | –           |
| Aromia moschata (Linnaeus, 1758)  | –            | –            | 30 (10)                | –            | –                      | –                 | –            | 0 (8)         | –           |
| Cleridae                         |               |               |                        |              |                        |                   |               |               |
| Allonyx quadrimaculatus (Schaller, 1783) | –          | –            | 2 (1)                  | 0 (2)        | –                      | –                 | –            | –             | –           |
In total, 18 species of Coleoptera, which are included or are planned to be included in the Red Data Books, from nine families, were indicated in the studies. Especially significant are the results for species that actively fly into crown traps for beer baits (*Quadius dilatatus*, *Gnorimus variabilis*, *Protaetia fieberi*, *Protaetia marmorata*, *Protaetia speciosissima*, *Elater ferrugineus*, *Purpuricenus kaehleri*, *Necydalis major*, *Leptura aurulenta*, *Aromia moschata*). The number of finds of such species increases significantly with an increase in the number of traps set. The use of such baits makes it possible to clarify even the status of species that have been included in the Red Data Books, and to suggest measures for their protection.

4. Discussion

Bait traps are an effective tool for studying the insect fauna of the upper tiers of forests. Forest crowns are usually studied to a lesser extent than the soil and herbal layer [73, 74]. Forest canopies did not attract researchers for a long time due to the logistical difficulties of reaching the tree crowns and the subsequent sampling problems. However, then there were original research methods, including slingshots, crossbows, ladders, networks of cranes, towers and passages, which facilitate the work [75,76,77,78].

The active attraction of insects by baits based on fermenting beer and wine with the addition of sugar and other sweet substances, as well as fruits, can be explained. Many insects have receptors that perceive carbohydrates. According to many modern studies, insects have an excellent ability to perceive sugar [79,80,81]. Sweet carbohydrates play a crucial role in the life of insects as valuable energy and food resources. Insects always use the perception of sugars to assess the nutritional value of the feed. Sugar and its decomposition products form the primary stimulatory signal for insect nutrition [82, 83]. The use of traps with our baits is based on the perception of sugars as food components. We note that many other substances (alcohols, ketones, and other volatile substances) are released during fermentation, which can also attract insects [84, 85, 86].

However, not all insects are equally lured into such traps. There are species that are particularly common in traps with a large number of specimens from the total number of species attracted to bait in fermental crown traps.

*Protaetia marmorata* (Scarabaeidae) (average occurrence was 72.2% over three years). This species inhabits various types of forests, and is found in parks, shelterbelts, and other biotopes [87,88,89]. Larval development occurs in the hollows of dead deciduous trees for three years [87, 89]. In beer traps, this is the most common type. It actively flies on a fermenting bait.

*Cryptarcha strigata* (Nitidulidae) (average occurrence was 51.2% over three years). It inhabits deciduous and mixed forests. Imagos are often found near the effluents of the fermenting sap of *Q. robur*, where the preimaginal phases of this species develop. Occasionally they are found on the leaking sap of *P. tremula* [90]. In beer traps, it is often found, sometimes with a very significant number.

*Glischrochilus grandis* (Nitidulidae) (average occurrence 33.6% was over three years). It inhabits a wide variety of forest biocenoses. It is common on the leaking sap of various trees where the larvae develop. It is also known from tinder plants, from rotten berries, and develops on various decaying substrates [91,92,93,94]. It is caught in traps with vinegar bait [95]. The peak number in beer traps is typical in May–June, single specimens are caught during all seasons.

*Protaetia fieberi* (Scarabaeidae) (average occurrence was 30.9% over three years). It inhabits various deciduous and mixed forests, and is common in parks and deciduous
second-growth forest. The larvae of this species are supraciliary. Larvae and frass inhabit the tree hollows (Quercus, Tilia, Fagus, Salix, Populus) made by various species of woodpeckers, owls, and small mammals [96]. Previously it was considered rare. However, our studies have shown that this species occurs regularly in different biotopes in the center of European Russia [97].

Leptura quadrifasciata (Cerambycidae) (average occurrence was 30.7% over three years). It is found in a wide range of biotopes. Larvae develop in dead or rotting wood, especially in the lower parts of standing trees, stumps, fallen trunks and branches of various trees (alder, aspen, poplar, birch (birch may be preferred to other trees), hazel, oak, sallow, beech, willow, elder). It inhabits wet or dry woodlands [98].

Soronia grisea (Nitidulidae) (average occurrence was 28.6% over three years). It is confined to oak forests and mixed stands with the presence of oak, where it is often found on the sap of Q. robur, Salix [90, 93, 94]. In Turkey, it was also caught on baits with beer in mixed forests and pine forests [99]. The peak number in beer traps is typical in May–June; single specimens are caught during all seasons.

Glischrochilus hortensis (Nitidulidae) (average occurrence was 28.5% over three years). It inhabits deciduous and mixed forests. Imago are found on the fermenting sap of Q. robur and under the bark of fallen and dying trees of B. pendula, P. tremula. Larvae develop under the bark of dying and damaged trees of B. pendula, P. tremula, and Q. robur and in their fermented sap, and can also occur on fermented berries, vegetables, and mushrooms [90, 94, 100]. The peak number in beer traps is typical in May; single specimens are caught during all seasons.

Rhagium mordax (Cerambycidae) (average occurrence was 26.2% over three years). It is one of the most common species. It inhabits mixed, deciduous forests, pine forests of various types [101]. Larvae develop under the bark of dead pine and deciduous trees [102]. It is regularly found in beer traps from the end of April to July.

Leptura thoracica (Cerambycidae) (average occurrence was 25.2% over three years). It is considered a polyphage of deciduous trees (Populus, Betula, Tilia, Salix, Fagus). The larvae inhabit the dead, rotten wood of thick trunks [103, 104, 105]. It has been observed that mass collections of this species occur in places with a predominance of Betula sp. in the stand [106]. The species was previously found in single specimens when studying the territory by conventional methods (net fishing, light fishing, window fishing) [101]. The use of beer traps has shown that the species is quite common in a wide range of biotopes.

Cetonia aurata (Scarabaeidae) (average occurrence was 18.0% over three years). It inhabits a wide range of biotopes. It is often found on the flowers from the families Umbelliferae, Rosacea, Asteraceae, where they feed on pollen and nectar [107]. Larvae develop in rotting wood and decaying plant substance [108]. It is found in beer traps, which are placed at low altitudes, most often up to 5 m. It is rarely caught in very high-placed traps.

Quedius dilatatus (Staphylinidae) (average occurrence was 15.4% over three years). This species is associated with Vespa crabro nests, where its larvae feed on Diptera larvae in the nest debris [109]. Therefore, it is often found on tree trunks, near the nests of Vespa crabro, but it is often observed in other places. It inhabits forest biocenoses. It is often observed on the trunks of trees in the leaking sap [110]. In beer traps it is caught in summer.

Protaetia cuprea volhyniensis (Scarabaeidae) (average occurrence was 14.9% over three years). It inhabits a wide variety of forest biocenoses. This is a myrmecophilic species, the larvae usually develop in active and abandoned anthills, sometimes in sawdust and garbage heaps. It is quite common on flowering plants [111, 112].

All of these species were trapped annually with approximately the same occurrence. It is highly likely that they will be caught if traps with fermenting liquid are set in a certain biotope during the season of activity of these species. On the other hand, those species can be caught that are very rare in the studied territory. For example, very rare species (Allonyx quadrimaculatus, Anoplodera rufipes ventralis, Leptura aurulenta, Purpuricenus globilicollis) are practically not caught, despite the use of different methods. Other species
which are not often detected with the help of other methods (Quedius dilatatus, Protaetia affinis, Protaetia fieberi, Protaetia speciosissima, Elater ferrugineus, Ctesias serra, Globicornis emarginata, Nacerdes carniolica, Purpuricenus kaehleri, Aromia moschata, Leptura thoracica, Neocydalis major, Xylotrechus pantherinus) are well lured by wandering baits and with the help of these baits their numbers can be estimated.

The quality of the bait can affect both the number of individuals caught and the species. Many effective traps have been suggested in several studies. For example, pineapple traps attract Scyphophorus acupunctatus (Curculionidae) better than fermented maguey [113]. The vinegar-ethanol-apple mixture was much more effective in attracting Eucryptorrhynchus scrobiculatus (Curculionidae) [114]. Bardiani et al. [115] successfully used baits made from various wines, beer, and banana puree to catch Lucanus cervus (Lucanidae). Traps with baits made of beer, palm wine, and various fruits (banana, mango, papaya, or pineapple) were successfully used to catch Cetoniinae (Scarabaeidae) [116]. Other studies [117] show that there were the greatest species richness and abundance of Cetoniinae in traps with bait made from banana juice and sugar cane, pineapple and sugar cane and only sugar cane juice compared to other baits. These results showed the importance of sugar cane juice, used either in isolation or as an additive in the fruit fermentation process, for effective sampling [117]. A mixture of banana, brown sugar, molasses, and baker’s yeast was used to study the Cerambycidae fauna [118]. On the other hand, Allemand and Aberlenc [35] used a mixture of beer and red wine in equal amounts to capture beetles without adding other ingredients (fruit flavors, sugar, honey). Thus, the species composition of Coleoptera in bait traps clearly depends on the specific composition of the bait itself [119]. Different fishing methods, when used correctly, can be an effective tool, for example, in monitoring biodiversity and studying rare insect species that are difficult to detect by other methods [44,120,122].

5. Conclusions

The biodiversity of Coleoptera that fall into crown traps is large. Over a three-year period, we observed 294 species from 45 families. Most families are represented by 1-3 species. The number of species actively attracted to bait is about a third of the total number of species in traps. At the same time, they account for 97.4% of the number of specimens. Two-year studies are sufficient to identify the Coleoptera biodiversity of a particular biotope. However, they need to be conducted during the entire insect activity season. Such studies will fully characterize the Coleoptera fauna. The largest number of species found in the traps belong to the families Cerambycidae, Elateridae, and Curculionidae. However, the actively attracted species mainly belong to the families Cerambycidae, Nitidulidae and Scarabaeidae. Their species of these families are equally attracted both by baits made of beer, and white and red wines.

We recommend the use of fermental crown traps with beer and wine for ecological studies of the Coleoptera fauna. This method can be applied to study the seasonal and spatial characteristics of the fauna. Especially good results can be obtained from studies of rare species that are actively attracted by such baits. It is possible to study the vertical-horizontal distribution of fauna in individual biotopes.

Supplementary Materials: The following are available online at www.mdpi.com/xxx/s1, Figure S1: title, Table S1: title, Video S1: title.

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Appendix A

Biodiversity and occurrence of Coleoptera from fermental traps in the European part of Russia in 2018-2020.

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Appendix A. Biodiversity and occurrence of Coleoptera from fermental traps in the European part of Russia in 2018-2020.

| Family, species                        | 2018 | 2019 | 2020 |
|----------------------------------------|------|------|------|
|                                        | Number of specimens | Occurrence, % | Number of specimens | Occurrence, % | Number of specimens | Occurrence, % |
| **Carabidae**                          |      |      |      |
| *Dromius agilis* (Fabricius, 1787)     | 1    | 0,24 |      |      |
| *Dromius quadraticollis* A. Morawitz, 1862 | 3    | 0,95 |      |      |
| *Harpalus distinguendus* (Duftschmid, 1812) | 1    | 0,24 |      |      |
| *Harpalus signaticornis* (Duftschmid, 1812) | 1    | 0,32 |      |      |
| *Harpalus xanthopus winkleri* Schaubberger, 1923 | 2    | 0,48 |      |      |
| *Lebia marginata* (Geoffroy, 1785)     | 1    | 0,32 |      |      |
| *Limodromus assimilis* (Paykull, 1790) | 2    | 0,48 |      |      |
| *Limodromus krynickii* (Sperk, 1835)   | 1    | 0,32 |      |      |
| *Tachyta nana* (Gyllenhal, 1810)       | 1    | 0,32 |      |      |
| **Dytiscidae**                         |      |      |      |
| *Ilybius erichsoni* (Gemminger & Harold, 1868) | 1    | 0,24 |      |      |
| *Ilybius fuliginosus* (Fabricius, 1792) | 1    | 0,32 |      |      |
| **Hydrochidae**                        |      |      |      |
| *Hydrochus brevis* (Herbst, 1793)      | 1    | 0,32 |      |      |
| **Histeridae**                         |      |      |      |
| *Atholus duodecimstriatus* (Schrank, 1781) | 1    | 0,32 |      |      |
| *Gnathoncus buyssoni* Auzat, 1917      | 7    | 1,89 | 6    | 1,19 |
| *Platysoma elongatum* (Thunberg, 1787) | 8    | 1,58 | 4    | 0,71 |
| *Platysoma lineare* Erichson, 1834     | 7    | 1,89 | 1    | 0,24 |
| **Silphidae**                          |      |      |      |
| *Dendroxena quadrimaculata* (Scopoli, 1771) | 3    | 0,95 | 41   | 5    |
| *Necrodes littoralis* (Linnaeus, 1758) | 2    | 2,4  | 21   | 1,58 | 45   | 4,76 |
| *Nicrophorus humator* (Gleditsch, 1767) | 1    | 1,2  |      |      | 4    | 0,71 |
| *Nicrophorus interruptus* Stephens, 1830 |      |      | 14   | 1,67 |      |      |
| *Nicrophorus sepultor* Charpentier, 1825 |      |      | 1    | 0,24 |      |      |
| *Nicrophorus vespillo* (Linnaeus, 1758) |      |      | 1    | 0,24 |      |      |
| *Nicrophorus vespilloides* Herbst, 1783 | 20   | 2,4  | 3    | 0,32 | 4    | 0,71 |
| *Oiceoptoma thoracicum* (Linnaeus, 1758) | 11   | 9,5  | 24   | 4,1  | 13   | 2,62 |
| *Silpha trisitis* Illiger, 1798         |      |      | 2    | 0,24 |      |      |
### Staphyllinidae

| Genus            | Species                        | Count | Length (mm) | Width (mm) | Height (mm) | Mass (g) | Width (mm) | Dry Weight |
|------------------|--------------------------------|-------|-------------|------------|-------------|----------|------------|------------|
| Staphyllinidae   | sp.                            | 13    | 13.1        | 423        | 22.08       | 252      | 28.57      |            |
| Philonthus       | sp.                            | 1     | 1.2         |            |             |          |            |            |
| Quedius dilatatus| (Fabricius, 1787)              | 6     | 6           | 329        | 23.66       | 221      | 16.67      |            |

### Lucanidae

| Genus            | Species                        | Count | Length (mm) | Width (mm) | Height (mm) | Mass (g) | Width (mm) | Dry Weight |
|------------------|--------------------------------|-------|-------------|------------|-------------|----------|------------|------------|
| Lucanus          | cervus (Linnaeus, 1758)        | 4     | 21.4        | 122        | 17.03       | 635      | 20.48      |            |
| Platucerus       | caprea (De Geer, 1774)         | 1     | 0.32        |            |             |          |            | 0.24       |
| Platucerus       | caraboides (Linnaeus, 1758)    |       |             |            |             |          |            | 0.24       |
| Sinodendron      | cylindricum (Linnaeus, 1758)   | 1     | 0.24        |            |             |          |            |            |

### Scarabaeidae

| Genus            | Species                        | Count | Length (mm) | Width (mm) | Height (mm) | Mass (g) | Width (mm) | Dry Weight |
|------------------|--------------------------------|-------|-------------|------------|-------------|----------|------------|------------|
| Cetonia          | aurata (Linnaeus, 1758)        | 60    | 21.4        | 122        | 17.03       | 635      | 20.48      |            |
| Esymus           | pusillus (Herbst, 1789)        | 1     | 0.24        |            |             |          |            |            |
| Gnornimus        | variabilis (Linnaeus, 1758)    | 16    | 7.1         | 33         | 5.99        | 12       | 2.14       |            |
| Osmoderna        | barnabita Motschulsky, 1845    | 2     | 0.32        |            |             |          |            |            |
| Protaetia        | affinis (Andersch, 1797)       | 1     | 1.2         |            |             | 2        | 0.24       |            |
| Protaetia        | fiebri (Kraatz, 1880)          | 56    | 33.3        | 250        | 30.28       | 617      | 29.29      |            |
| Protaetia        | marmorata (Fabricus, 1792)     | 750   | 82.1        | 2443       | 67.51       | 2550     | 67.14      |            |
| Protaetia        | speciosissima (Scopoli, 1786)  | 16    | 10.7        | 64         | 8.52        | 34       | 5          |            |
| Protaetia        | cuprea volhyniensis (Gory & Percheron, 1833) | 13 | 11.9 | 100 | 17.03 | 327 | 15.71 |
| Serica           | brunnea (Linnaeus, 1758)       | 1     | 0.32        |            | 1           | 0.24     |            |            |
| Trichius         | fasciatus (Linnaeus, 1758)     | 4     | 1.2         |            | 1           | 0.24     |            |            |

### Scirtidae

| Genus            | Species                        | Count | Length (mm) | Width (mm) | Height (mm) | Mass (g) | Width (mm) | Dry Weight |
|------------------|--------------------------------|-------|-------------|------------|-------------|----------|------------|------------|
| Contacyphon      | padi (Linnaeus, 1758)          | 4     | 1.26        |            |             |          |            |            |
| Contacyphon      | pubescens (Fabricius, 1792)    | 3     | 0.63        |            |             |          |            |            |
| Contacyphon      | sp.                            | 1     | 0.32        | 2          | 0.48        |          |            |            |
| Microcara        | testacea (Linnaeus,1767)       | 2     | 1.2         | 1          | 0.32        | 3        | 0.71       |            |

### Buprestidae

| Genus            | Species                        | Count | Length (mm) | Width (mm) | Height (mm) | Mass (g) | Width (mm) | Dry Weight |
|------------------|--------------------------------|-------|-------------|------------|-------------|----------|------------|------------|
| Agrilus          | sulcicollis Lacordaire, 1835   | 2     | 0.63        |            |             |          |            |            |
| Agrilus          | angustulus (Illiger, 1803)     | 1     | 0.24        |            |             |          |            |            |
| Anthaxia         | quadripunctata (Linnaeus, 1758) | 1    | 0.24        |            |             |          |            |            |
| Buprestis        | haemorrhoidalis Herbst, 1780   | 1     | 0.32        |            |             |          |            |            |
| Dicera           | alni (Fischer von Waldheim, 1824) | 1  | 0.32        |            |             |          |            |            |
| Phaenops         | cyanea (Fabricius, 1775)       | 2     | 0.63        |            |             |          |            |            |
| Trachys          | minutus (Linnaeus, 1758)       | 1     | 0.32        |            |             |          |            |            |

### Eucnemidae

| Genus            | Species                        | Count | Length (mm) | Width (mm) | Height (mm) | Mass (g) | Width (mm) | Dry Weight |
|------------------|--------------------------------|-------|-------------|------------|-------------|----------|------------|------------|

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| Species                                                                 | Count | Log10 | Count2 | Log2 |
|------------------------------------------------------------------------|-------|-------|--------|------|
| Melasis buprestoides (Linnaeus, 1760)                                   | 1     | 0,24  |        |      |
| *Otho sphondyloides* (Germar, 1818)                                     | 1     | 0,32  |        |      |
| **Throscidae**                                                          |       |       |        |      |
| Trixagus sp.                                                            | 4     | 0,95  | 9      | 1,13 |
| Aulonothroscus sp.                                                      | 1     | 0,32  |        |      |
| **Elateridae**                                                          |       |       |        |      |
| Agriotes lineatus (Linnaeus, 1767)                                      | 1     | 0,24  |        |      |
| Agriotes obscurus (Linnaeus, 1758)                                      | 1     | 0,24  |        |      |
| Agrypnus murinus (Linnaeus, 1758)                                       | 7     | 2,21  | 29     | 5,48 |
| Ampedus baltatus (Linnaeus, 1758)                                       | 2     | 0,63  | 5      | 1,19 |
| Ampedus cinnabarinus (Eschscholtz, 1829)                                | 9     | 2,21  | 97     | 5    |
| Ampedus elongatus (Fabricius, 1787)                                     | 3     | 0,95  | 1      | 0,24 |
| Ampedus nigerrimus (Lacordaire in Boisduval & Lacordaire, 1835)         | 1     | 0,24  |        |      |
| Ampedus nigrinus (Herbst, 1784)                                         | 1     | 0,32  |        |      |
| Ampedus nigroflavus (Goeze, 1777)                                       | 13    | 1,9   |        |      |
| Ampedus pomonae (Stephens, 1830)                                        | 1     | 0,32  | 13     | 1,67 |
| Ampedus pomorum (Herbst, 1784)                                          | 4     | 1,26  | 97     | 9,05 |
| Ampedus praeustus (Fabricius, 1792)                                     | 1     | 0,32  | 13     | 1,67 |
| Ampedus sanguinolentus (Schrank, 1776)                                  | 3     | 0,95  | 45     | 4,05 |
| Ampedus sanguineus (Linnaeus, 1758)                                     | 3     | 0,48  |        |      |
| Ampedus tristis (Linnaeus, 1758)                                        | 1     | 0,24  |        |      |
| Aplotarsus incanus (Gyllenhal, 1827)                                    | 1     | 0,32  |        |      |
| Athous haemorrhoidalis (Fabricius, 1801)                                | 1     | 0,24  |        |      |
| Athous subfuscus (O.F. Müller, 1764)                                    | 2     | 0,32  | 2      | 0,48 |
| Athous vittatus (Fabricius, 1792)                                       | 1     | 0,32  | 4      | 0,95 |
| Cardiophorus ruficollis (Linnaeus, 1758)                                | 1     | 0,32  | 1      | 0,24 |
| Dalopius marginatus (Linnaeus, 1758)                                    | 1     | 1,2   | 24     | 3,79 |
| Danosoma fasciatum (Linnaeus, 1758)                                     | 1     | 0,32  |        |      |
| Denticollis borealis (Paykull, 1800)                                    | 1     | 0,32  | 2      | 0,48 |
| Ectinus aterrimus (Linnaeus, 1760)                                      | 1     | 0,32  |        |      |
| Elater ferrugineus Linnaeus, 1758                                        | 2     | 2,4   | 6      | 1,89 |
| Hemicrepidius niger (Linnaeus, 1758)                                    | 1     | 0,24  |        |      |
| Lacon lepidopterus (Panzer, 1800)                                       | 1     | 0,24  |        |      |
| Limonius minutus (Linnaeus, 1758)                                       | 3     | 0,95  | 4      | 0,95 |
| Melanotus castanipes (Paykull, 1800)                                    | 8     | 2,52  | 9      | 1,19 |
| Melanotus villosus (Geoffroy, 1785)                                     | 5     | 0,95  |        |      |
| Mosotalesus nigricornis (Panzer, 1799)                                  | 3     | 0,63  | 1      | 0,24 |
| Prosternon tessilatum (Linnaeus, 1758)                                  | 1     | 1,2   | 14     | 3,47 |
| Selatosomus aeneus (Linnaeus, 1758)                                     | 1     | 0,32  | 17     | 1,43 |
| Family          | Genus and Species                                                                 | Count | Index | Total | Mean |
|-----------------|-----------------------------------------------------------------------------------|-------|-------|-------|------|
| Sericidae       | Sericus brunneus (Linnaeus, 1758)                                                 | 1     | 0.24  |       |      |
| Lycidae         | Lygistopterus sanguineus (Linnaeus, 1758)                                         | 8     | 1.26  |       |      |
| Cantharidae     | Cantharis flavilabris Fallén, 1807                                                | 1     | 0.32  |       |      |
|                 | Cantharis livida Linnaeus, 1758                                                    | 12    | 2.4   | 6     | 1.26 |
|                 | Cantharis nigricans O.F. Müller, 1776                                             | 2     | 1.2   | 9     | 2.84 |
|                 | Cantharis pallida Goeze, 1777                                                     | 7     | 0.95  |       |      |
|                 | Cantharis pellucida Fabricius, 1792                                               | 10    | 1.26  | 83    | 5.24 |
|                 | Cantharis rufa Linnaeus, 1758                                                     | 4     | 0.95  | 1     | 0.24 |
|                 | Cantharis rustica Fallén, 1807                                                    | 1     | 1.2   | 12    | 0.95 |
|                 | Malthodes guttifer Kiesenwetter, 1852                                              | 2     | 0.48  |       |      |
|                 | Malthodes sp.                                                                       | 1     | 0.24  |       |      |
|                 | Podabrus alpinus (Paykull, 1798)                                                   | 1     | 0.24  |       |      |
|                 | Rhagonycha fulva (Scopoli, 1763)                                                   | 1     | 1.2   | 1     | 0.24 |
|                 | Rhagonycha fugax Mannerheim, 1843                                                  | 4     | 0.71  |       |      |
|                 | Rhagonycha lignosa (O.F. Müller, 1764)                                            | 4     | 0.95  |       |      |
|                 | Rhagonycha nigriventris Motschulsky, 1860                                          | 2     | 0.48  |       |      |
| Dermentidae     | Attagenus schaefferi (Herbst, 1792)                                               | 107   | 4.42  | 16    | 2.38 |
|                 | Anthrenus museorum (Linnaeus, 1760)                                               | 1     | 0.32  |       |      |
|                 | Ctesias serr (Fabricius, 1792)                                                     | 39    | 4.42  |       |      |
|                 | Dermestes lanarius Illiger, 1801                                                   | 1     | 0.32  |       |      |
|                 | Dermestes lardarius Linnaeus, 1758                                                 | 1     | 0.32  | 1     | 0.24 |
|                 | Dermestinus murinus Linnaeus, 1758                                                 | 1     | 0.32  | 4     | 0.71 |
|                 | Globicornis emarginata (Gyllenhal, 1808)                                          | 27    | 2.52  | 17    | 2.14 |
|                 | Megatoma undata (Linnaeus, 1758)                                                   | 1     | 0.32  | 2     | 0.48 |
|                 | Trogoderma glabrum (Herbst, 1783)                                                 | 2     | 2.4   | 88    | 5.68 |
| Ptinidae        | Dorcatoma dresdensis Herbst, 1792                                                 | 1     | 0.32  |       |      |
|                 | Dorcatoma flavicornis (Fabricius, 1792)                                           | 1     | 0.32  |       |      |
|                 | Dorcatoma robusta A. Strand, 1938                                                  | 6     | 1.58  | 1     | 0.24 |
| Lymexylidae     | Elateroides dermestoides (Linnaeus, 1760)                                         | 1     | 0.24  |       |      |
| Cleridae        | Allonyx quadrimaculatus (Schaller, 1783)                                          | 2     | 0.63  |       |      |
| Species                             | Genus          | Year     | 1st | 2nd | 3rd | 4th |
|-------------------------------------|----------------|----------|-----|-----|-----|-----|
| Thanasimus femoralis                | Zetterstedt    | 1828     | 3   | 0,95| 2   | 0,48|
| Thanasimus formicarius              | Linnaeus       | 1758     | 4   | 1,26| 3   | 0,71|
| Tillus elongatus                    | Linnaeus       | 1758     | 1   | 0,32|     |     |
| Trichodes apiarus                   | Linnaeus       | 1758     | 1   | 1,2 | 2   | 0,63| 3   | 0,71|
| Melyridae                           |                |          |     |     |     |     |
| Cordylepherus viridis               | Fabricius      | 1787     | 1   | 0,32| 3   | 0,71|
| Dasytes niger                       | Linnaeus       | 1760     | 1   | 1,2 | 10  | 3,15| 12  | 1,9 |
| Dasytes fusculus                    | Illiger        | 1801     | 1   | 0,32| 7   |     |     | 0,95|
| Malachius bipustulatus              | Linnaeus       | 1758     | 5   |     |     | 0,95|
| Erotylidae                          |                |          |     |     |     |     |
| Triplax russica                     | Linnaeus       | 1758     | 2   | 0,63| 1   | 0,24|
| Tritoma subbasalis                 | Reitter        | 1896     | 2   |     |     | 0,48|
| Monotomidae                         |                |          |     |     |     |     |
| Rhizophagus fenestralis             | Linnaeus       | 1758     | 15  | 2,84| 39  | 4,29|
| Nitidulidae                         |                |          |     |     |     |     |
| Carpophilus hemipterus              | Linnaeus       | 1758     | 10  | 2,21| 2   | 0,48|
| Carpophilus marginellus             | Motschulsky    | 1858     |     |     |     | 0,24|
| Carpophilus sp.                     |                |          | 1   |     | 0,32|
| Cryptarcha strigata                 | Fabricius      | 1787     | 249 | 60,7| 1227| 44,79| 1406| 48,09|
| Cryptarcha undata                   | G.-A. Olivier  | 1790     | 8   | 3,6 | 14  | 3,78| 105 | 8,57|
| Cychramus luteus                    | Fabricius      | 1787     | 9   | 6   | 834 | 12,3| 101 | 6,9 |
| Cychramus variegatus                | Herbst         | 1792     | 4   | 1,2 | 56  | 5,05| 15  | 1,43|
| Cyllodes ater                       | Herbst         | 1792     | 1   | 1,2 |     | 1   | 0,24|
| Epuraea sp.                         |                |          | 8   | 8,3 | 268 | 15,77| 437 | 19,52|
| Glischrochilus grandis              | Tournier       | 1872     | 47  | 25  | 652 | 25,24| 4876| 50,48|
| Glischrochilus hortensis            | Geoffroy       | 1785     | 71  | 25  | 885 | 28,08| 783 | 32,38|
| Glischrochilus quadriguttatus       | Fabricius      | 1777     | 1   | 1,2 | 33  | 5,68| 3   | 0,71|
| Glischrochilus quadripunctatus      | Linnaeus       | 1758     | 2   | 2,4 | 96  | 11,04| 105 | 11,19|
| Glischrochilus quadrisignatus       | Say            | 1835     | 2   | 2,4 | 13  | 2,52| 75  | 6,19|
| Meligethes sp.                      |                |          | 3   |     | 0,63| 6   | 0,24|
| Omosita discoidea                   | Fabricius      | 1775     |     | 1   |     | 0,32|
| Pocadius ferrugineus                | Fabricius      | 1775     |     |     |     | 1   | 0,24|
| Soronia grisea                      | Linnaeus       | 1758     | 47  | 21,4| 363 | 25,24| 654 | 39,05|
| Soronia punctatissima               | Illiger        | 1794     |     |     |     | 3   | 0,95| 5   | 0,48|
| Silvanidae                          |                |          |     |     |     |     |
| Uleiota planatus                    | Linnaeus       | 1760     | 1   |     |     | 0,32|
| Family          | Species                        | Number | Length | Width | Height |
|-----------------|--------------------------------|--------|--------|-------|--------|
| Cucujidae       | *Pediacus depressus* (Herbst, 1797) | 15     | 3,47   | 29    | 2,86   |
| Laemophloeidae  | *Cryptolestes sp.*              | 1      | 0,32   |       |        |
| Cerylonidae     | *Cerylon ferrugineum* Stephens, 1830 | 2      | 0,32   |       |        |
|                 | *Cerylon histeroides* (Fabricius, 1792) | 1      | 0,32   |       |        |
| Latridiidae     | *Corticaria sp.*                | 2      | 0,48   |       |        |
|                 | *Cortinicara gibbosa* (Herbst, 1793) | 1      | 0,32   | 1     | 0,24   |
|                 | *Enicmus histrio* Joy & Tomlin, 1910 | 1      | 0,32   |       |        |
|                 | *Stephostethus pandellei* (C.N.F. Brisout de Barneville, 1863) | 2      | 0,63   |       |        |
| Coccinellidae   | *Adalia bipunctata* (Linnaeus, 1758) | 1      | 0,24   |       |        |
|                 | *Adalia decempunctata* (Linnaeus, 1758) | 1      | 0,24   |       |        |
|                 | *Anatis ocellata* (Linnaeus, 1758) | 1      | 0,32   | 4     | 0,95   |
|                 | *Calvia decemguttata* (Linnaeus, 1767) | 1      | 1,2    | 6     | 1,26   |
|                 | *Calvia quatuordecimguttata* (Linnaeus, 1758) | 7      | 2,21   | 14    | 2,38   |
|                 | *Chilocorus renipustulatus* (L.G. Scriba, 1791) | 2      | 0,63   |       |        |
|                 | *Coccinella magnifica* L. Redtenbacher, 1843 | 2      | 0,48   |       |        |
|                 | *Coccinella septempunctata* (Linnaeus, 1758) | 1      | 0,24   |       |        |
|                 | *Exochomus quadripustulatus* (Linnaeus, 1758) | 1      | 0,24   |       |        |
|                 | *Halycia sedgecimguttata* (Linnaeus, 1758) | 1      | 1,2    | 5     | 1,58   |
|                 | *Harmonia axyridis* (Pallas, 1773) | 1      | 0,24   |       |        |
|                 | *Harmonia quadripunctata* (Pontoppidan, 1763) | 2      | 0,63   | 6     | 1,19   |
|                 | *Hippodamia variegata* (Goeze, 1777) | 1      | 0,32   | 1     | 0,24   |
|                 | *Mysia oblongoguttata* (Linnaeus, 1758) | 1      | 0,32   | 5     | 1,19   |
|                 | *Oenopia conglobata* (Linnaeus, 1758) | 1      | 0,32   | 2     | 0,48   |
|                 | *Propylea quatuordecimpunctata* (Linnaeus, 1758) | 1      | 0,32   | 1     | 0,24   |
|                 | *Sospita vigintiguttata* (Linnaeus, 1758) | 1      | 0,32   |       | 0,24   |
|                 | *Vibidia duodecimguttata* (Poda von Neuhaus, 1761) | 1      | 0,24   |       |        |
| Mycetophagidae  | *Litargus connexus* (Geoffroy, 1785) | 17     | 3,47   | 11    | 1,19   |
|                 | *Mycetophagus quadripustulatus* (Linnaeus, 1760) | 1      | 0,32   | 2     | 0,48   |
| Melandryidae    |                                |        |        |       |        |
| Family          | Species                        | Count | Index | 1     | 2     |
|----------------|--------------------------------|-------|-------|-------|-------|
| Osphya bipunctata (Fabricius, 1775) |                                | 1     | 0,24  |       |       |
| Phloiotrya subtilis (Reitter, 1897)  |                                | 1     | 0,24  |       |       |
| Mordellidae     | Tomoxia bucephala A. Costa, 1854 | 7     | 1,89  | 1     | 0,24  |
|                 | Mordella sp.                    | 3     | 0,63  | 1     | 0,24  |
| Tenebrionidae   | Bolitophagus reticulatus (Linnaeus, 1767) | 3     | 0,71  |       |       |
|                 | Corticeus unicolor Piller & Mitterpacher, 1783 |       | 2     | 0,48  |       |
|                 | Lagria hirta (Linnaeus, 1758)    | 19    | 4,73  | 3     | 0,71  |
|                 | Mycetochara axillaris (Paykull, 1799) | 1     | 0,32  |       |       |
|                 | Mycetochara flavipes (Fabricius, 1792) | 1     | 0,32  | 1     | 0,24  |
|                 | Upis ceramboides (Linnaeus, 1758) | 4     | 0,95  | 1     | 0,24  |
| Oedemeridae     | Chrysanthia geniculata W.L.E. Schmidt, 1846 | 6     | 1,19  |       |       |
|                 | Chrysanthia viridissima (Linnaeus, 1758) | 2     | 2,4   | 4     | 0,71  |
|                 | Nacerdes carniolica (Gistel, 1834) | 38    | 1,67  |       |       |
|                 | Oedemera femorata (Scopoli, 1763) | 1     | 0,24  |       |       |
|                 | Oedemera virescens (Linnaeus, 1767) | 1     | 0,24  |       |       |
| Boridae         | Boros schneideri (Panzer, 1796)  | 1     | 0,24  |       |       |
| Pyrochroidae    | Pyrochroa coccinea (Linnaeus, 1760) | 1     | 0,32  | 9     | 0,71  |
|                 | Schizotus pectinicornis (Linnaeus, 1758) | 1     | 0,32  | 14    |       |
| Salpingidae     | Salpingidae sp. | 1     | 0,32  |       |       |
|                 | Salpingus ruficollis (Linnaeus, 1760) | 1     | 0,24  |       |       |
| Aderidae        | Phytobaenus amabilis R.F. Sahlberg, 1834 | 1     | 0,24  |       |       |
| Scaptiidae      | Anaspis frontalis (Linnaeus, 1758) | 1     | 1,2   | 1     | 0,32  |
|                 | Anaspis thoracica (Linnaeus, 1758) | 1     | 0,24  |       |       |
| Cerambycidae    | Aegomorphus clavipes (Schrank, 1781) | 1     | 1,2   | 1     | 0,32  |
| Species Name                  | Author (Year) | Males | Adults | Females | Males | Adults | Females | Males | Adults | Females |
|------------------------------|---------------|-------|--------|---------|-------|--------|---------|-------|--------|---------|
| *Alosterna ingrica*          | Baeckmann, 1902 | 1     | 0,32   |         | 1     | 0,24   |         |
| *Alosterna tabacicolor*      | De Geer, 1775  |       |        |         | 1     | 0,32   |         |
| *Anaesthetis testacea*       | Fabricius, 1781 |      |        |         | 1     | 0,32   |         |
| *Anastrangalia reyi*         | L. Heyden, 1889 | 1     | 0,32   |         | 2     | 0,48   |         |
| *Anoplodera rufipes ventralis* | Heyden, 1886   |      |        |         | 1     | 0,24   |         |
| *Anoplodera sexguttata*      | Fabricius, 1775 | 1     | 0,32   |         | 23    | 3,15   |         |
| *Aromia moschata*            | Linnaeus, 1758 | 23    | 11,9   | 10,09   | 23    | 3,33   |         |
| *Chlorophorus herbstii*      | Brahm, 1790    | 1     |        |         |       |        | 0,32   |
| *Cortodera femorata*         | Fabricius, 1787 |       |        |         |       |        |         |
| *Dinoptera collaris*         | Linnaeus, 1758 | 4     | 1,26   | 0,95    |       |        |         |
| *Etorofus pubescens*         | Fabricius, 1781 | 1     | 0,32   |         |       |        |         |
| *Euracmaeops marginatus*     | Fabricius, 1866 | 1     | 0,32   |         |       |        |         |
| *Euracmaeops septentrionis*  | C.G. Thomson, 1866 | 1     | 0,32   |         |       |        |         |
| *Judolia sexmaculata*        | Linnaeus, 1758 | 1     | 0,32   |         |       |        |         |
| *Leiopus linnei*             | Wallin, Nylander & Kvamme, 2009 |       |        |         |       |        |         |
| *Leptura aurulenta*          | Fabricius, 1793 | 2     | 2,4    |         | 1     | 0,32   |         |
| *Leptura thoracica*          | Creutzer, 1799 | 68    | 22,6   | 31,55   | 1113  | 21,43  |         |
| *Leptura quadrifasciata*     | Linnaeus, 1758 | 104   | 35,7   | 37,22   | 433   | 19,29  |         |
| *Leptura nigripes*           | De Geer, 1775  | 2     | 1,2    |         | 14    | 1,89   |         |
| *Lepturobosca viridens*      | Linnaeus, 1758 | 5     | 0,48   |         |       |        |         |
| *Mesosa myops*               | Dalman, 1817   | 5     | 3,6    |         | 13    | 2,84   | 1       |
| *Molorchus minor*            | Linnaeus, 1758 | 3     | 0,95   |         | 12    | 2,38   |         |
| *Monochamus sutor*           | Linnaeus, 1758 | 1     | 0,32   |         |       |        |         |
| *Necydalis major*            | Linnaeus, 1758 | 9     | 7,1    | 10,73   | 32    | 5,71   |         |
| *Nivellia sanguinosa*        | Gyllenhal, 1827 | 1     | 0,32   |         |       |        |         |
| *Obrium cantharinum*         | Linnaeus, 1767 | 1     | 1,2    |         | 45    | 5,68   | 104     |
| *Oedecnema gebleri*          | Ganglbauer, 1889 | 2     | 0,48   |         |       |        |         |
| *Pachyta quadrimaculata*     | Linnaeus, 1758 | 4     | 3,6    | 1,58    | 3     | 0,71   |         |
| *Phymatodes testaceus*       | Linnaeus, 1758 | 2     | 0,32   |         | 24    | 2,86   |         |
| *Plagionotus arcuatus*       | Linnaeus, 1758 | 2     | 0,48   |         |       |        |         |
| *Plagionotus detritus*       | Linnaeus, 1758 | 1     | 1,2    |         | 8     | 2,21   | 119     |
| *Prionus coriarius*          | Linnaeus, 1758 | 1     | 0,32   |         |       |        |         |
| *Purpuricenus globulicollis* | Dejean, 1839   | 5     | 0,95   |         | 1     | 0,24   |         |
| *Purpuricenus kaelesi*       | Linnaeus, 1758 | 7     | 7,1    | 11,04   | 167   | 7,62   |         |
| *Rhagium inquisitor*         | Linnaeus, 1758 | 24    | 4,73   |         | 10    | 1,9    |         |
| *Rhagium mordax*             | De Geer, 1775  | 49    | 20,2   | 24,29   | 778   | 34,05  |         |
| *Rhemnusium bicolor*         | Schrank, 1781  | 2     | 2,4    |         |       |        |         |
| *Ropalopus clavipes*         | Fabricius, 1775 | 1     | 1,2    |         |       |        |         |
| *Ropalopus macropus*         | Germar, 1823   | 2     | 0,24   |         |       |        |         |
| *Rutpela maculata*           | Poda von Neuhaus, 1761 | 9     | 7,1    | 3,15   | 16    | 2,38   |         |
| Species                        | Count | Length | Width | Height | Date  | Area  |
|-------------------------------|-------|--------|-------|--------|-------|-------|
| *Saperda scalaris* (Linnaeus, 1758) | 1     | 0,24   |       |        |       |       |
| *Spondylis buprestoides* (Linnaeus, 1758) | 2     | 0,63   | 1     | 0,24   |       |       |
| *Stenocorus meridianus* (Linnaeus, 1758) | 7     | 8,3    | 93    | 11,67  | 38    | 1,9   |
| *Stenurella melanura* (Linnaeus, 1758) | 1     | 0,24   |       |        |       |       |
| *Stictoleptura maculicornis* (De Geer, 1775) | 2     | 0,63   | 2     | 0,48   |       |       |
| *Stictoleptura rubra* (Linnaeus, 1758) | 2     | 0,63   | 1     | 0,24   |       |       |
| *Stictoleptura variicornis* (Dalman, 1817) | 1     | 0,32   |       |        |       |       |
| *Strangalia attenuata* (Linnaeus, 1758) | 8     | 1,89   | 2     | 0,48   |       |       |
| *Trichoferus campestris* (Faldermann, 1835) | 2     | 2,4    | 7     | 0,95   | 1     | 0,24 |
| *Xylotrechus antilope* (Schoenherr, 1817) | 17    | 3,47   | 34    | 4,29   |       |       |
| *Xylotrechus arvicola* (Olivier, 1795) | 1     | 1,2    | 2     | 0,48   |       |       |
| *Xylotrechus capricornus* (Gebler, 1830) |       |        |       |        |       |       |
| *Xylotrechus pantherinus* (Savenius, 1825) | 2     | 0,63   | 1     | 0,24   |       |       |
| *Xylotrechus rusticus* (Linnaeus, 1758) | 3     | 0,95   | 1     | 0,24   |       |       |

**Clydsomelidae**

| Species                        | Count | Length | Width | Height |
|-------------------------------|-------|--------|-------|--------|
| *Altica* sp.                  | 5     | 1,58   | 8     | 1,43   |
| *Aphthona* sp.                |       |        |       | 0,24   |
| *Chrysomela vigintipunctata* (Scopoli, 1763) | 1     | 0,32   |       |        |
| *Crepidodera aurata* (Marsham, 1802) | 1     | 0,32   |       |        |
| *Crepidodera nitidula* (Linnaeus, 1758) | 1     | 0,32   |       |        |
| *Galerucella lineola* (Fabricius, 1781) | 2     | 0,63   | 2     | 0,48   |
| *Goniocreta viminalis* (Linnaeus, 1758) | 1     | 0,24   |       |        |
| *Hypocassida subferruginea* (Schrank, 1776) | 1     | 0,24   |       |        |
| *Lochmaea caprea* (Linnaeus, 1758) | 2     | 0,32   |       |        |
| *Orsodacne cerasi* (Linnaeus, 1758) | 2     | 0,48   |       |        |
| *Phyllothere undulata* Kutschera, 1860 | 1     | 0,24   |       |        |
| *Plagiosterna aenea* (Linnaeus, 1758) | 1     | 0,32   | 1     | 0,24   |

**Anthribidae**

| Species                        | Count | Length | Width | Height |
|-------------------------------|-------|--------|-------|--------|
| *Dissoleucas niveirostris* (Fabricius, 1798) | 1     | 0,24   |       |        |
| *Tropideres albitrostris* (Schaller, 1783) | 2     | 0,63   | 5     | 1,19   |

**Attelabidae**

| Species                        | Count | Length | Width | Height |
|-------------------------------|-------|--------|-------|--------|
| *Bytiscus betulae* (Linnaeus, 1758) | 1     | 0,24   |       |        |

**Brentidae**

| Species                        | Count | Length | Width | Height |
|-------------------------------|-------|--------|-------|--------|
| *Betulapion simile* (Kirby, 1811) | 1     | 0,32   | 1     | 0,24   |

**Curculionidae**

| Species                        | Count | Length | Width | Height | Date  | Area  |
|-------------------------------|-------|--------|-------|--------|-------|-------|
| *Anisandrus dispar* (Fabricius, 1792) | 1     | 1,2    | 386   | 10,73  | 2012  | 17,86 |
| *Anthonomus incurvus* (Panzer, 1795) | 1     | 0,32   |       |        |       |       |
| Species                                      | Count | Frequency |
|---------------------------------------------|-------|-----------|
| Bagous puncticollis Boheman, 1845            | 1     | 0,32      |
| Brachyderes incanus (Linnaeus, 1758)         | 2     | 0,63      |
| Coeliodinus rubicundus (Herbst, 1795)        | 2     | 0,63      |
| Curculio glandium Marsham, 1802              | 1     | 0,32      |
| Curculio nucum Linnaeus, 1758                | 2     | 2,4       |
| Curculio venosus (Gravenhorst, 1807)         | 1     | 0,32      |
| Curculio villosus Fabricius, 1781            | 4     | 0,95      |
| Ellescus bipunctatus (Linnaeus, 1758)        | 1     | 0,32      |
| Ellescus scanicus (Paykull, 1792)            | 1     | 0,32      |
| Hylastes opacus Erichson, 1836               | 2     | 0,63      |
| Ips acuminatus (Gyllenhal, 1827)             | 1     | 0,32      |
| Ips typographus (Linnaeus, 1758)             | 1     | 0,32      |
| Orchestes rusi (Herbst, 1795)                | 1     | 0,32      |
| Phyllobius arborator (Herbst, 1797)          | 1     | 0,32      |
| Phyllobius argentatus (Linnaeus, 1758)       | 6     | 1,26      |
| Phyllobius maculicornis Germar, 1823         | 2     | 0,63      |
| Phyllobius pomaceus Gyllenhal, 1834          | 1     | 0,32      |
| Phyllobius pyri (Linnaeus, 1758)             | 4     | 0,63      |
| Pissodes piniphilus (Herbst, 1797)           | 1     | 0,32      |
| Polydrusus cervinus (Linnaeus, 1758)         | 1     | 0,32      |
| Polydrusus flavipes (De Geer, 1775)          | 1     | 1,2       |
| Polydrusus sp.                               | 1     | 0,32      |
| Polydrusus tereticollis (De Geer, 1775)      | 1     | 0,32      |
| Polygraphus subopacus C.G. Thomson, 1871     | 1     | 0,32      |
| Scoytus intricatus (Ratzeburg, 1837)         | 1     | 0,32      |
| Sitona ambiguus Gyllenhal, 1834              | 1     | 0,32      |
| Sitona macularius (Marsham, 1802)            | 1     | 0,32      |
| Strophosoma capitatum (De Geer, 1775)        | 5     | 1,26      |
| Trypodendron signatum (Fabricius, 1792)      | 1     | 0,32      |
| Xyleborus saxesenii (Ratzeburg, 1837)        | 92    | 1,26      |
| TOTAL                                       | 1750  | 11655     |

Total 19864.