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Research Article

Checklist of beetles (Coleoptera) from the cork oak forest of Larache (Morocco)

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Abstract. The cork oak forest of Larache, a vital part of Morocco Atlantic coastal cork oak woodlands, plays a crucial role in supporting local ecosystems and human societies. However, it is increasingly threatened by intensive agriculture and other anthropogenic pressures, resulting in habitat loss for insects, including beetle communities. This study aimed to establish a comprehensive inventory of beetles in the cork oak forest of Larache over two consecutive years (2021 and 2022) by examining beetles associated with different vegetative landscapes using various trapping techniques (pitfall and pan traps) and direct surveys. The results revealed 180 species from 37 families, including 9 endemic species, 33 species newly recorded in Morocco, 13 saproxylic species, and 10 species listed on the Red List (7 saproxylic and 3 coprophagous species). This diversity underscores the ecological importance of the cork oak forest of Larache and highlights the urgent need for conservation measures and the promotion of suitable habitats to protect these insect communities.

Keywords: Conservation, Sampling, Diversity, Atlantic coast, Africa

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Introduction

The Mediterranean region, encompassing approximately 10% of the world's plant species within just 1.6% of the Earth's land surface (Médail & Quézel, 1997), serves as a vital reservoir of biodiversity. This area supports ecosystems and natural habitats of significant ecological and socio-economic value (Xofis *et al.*, 2024). On its southern shore, forests are indispensable to human societies, providing essential resources such as fuelwood for cooking and heating, fruits, nuts, and medicinal plants that enhance local food security and health (Tsiakiris *et al.*, 2024). Moreover, these forests underpin the livelihoods of many rural communities through activities like resin tapping, cork production, and ecotourism (Fernandes *et al.*, 2024). Beyond their tangible contributions, Mediterranean forests offer critical ecosystem services, including soil erosion control, carbon sequestration, and water regulation functions that are especially crucial in a region highly susceptible to desertification and climatic variability (Fernandes *et al.*, 2024). However, the escalating impacts of global changes, such as climate change, deforestation, land degradation and biodiversity loss, pose severe threats to the sustainability of these ecosystems and their ability to provide essential services to local communities (Bajocco *et al.*, 2012).

In Morocco, the cork oak forests of the Atlantic coastal plain still host various biotopes due to the variability of site conditions and adapted agro-silvo-pastoral systems. Currently, these cork oak woodlands are experiencing severe degradation, which has been exacerbated over the past two decades by the impacts of climate change and significant human pressure. This pressure has intensified due to population growth, the accelerated settlement of communities within forest enclaves and along its edges, and the transformation of traditional land-use practices (Machouri, 2009).

Among the key components of the cork oak forests on the Atlantic coast is the cork oak forest of Larache, which holds significant ecological, economic, and cultural value (Ballouche, 2024). This forest is a crucial habitat

for numerous threatened species (Samih *et al.*, 2024). However, This region is significantly affected by the development of clonal eucalyptus plantations, which deplete local water resources, alter soil composition, and hinder native species regeneration (Peñuelas & Sardans, 2021; Zerga *et al.*, 2021) and modern irrigated agriculture, while boosting crop yields, relies on intensive water use and chemical inputs, contributing to aquifer depletion and soil degradation, further threatening ecosystem sustainability and biodiversity (Benabdelkader *et al.*, 2021). These detrimental practices of deforestation and clearing of cork oak for agriculture and pastoralism disrupt and eliminate habitats for numerous animals, including the insect community. Insects systematically provide essential services such as pollination, organic matter recycling, natural pest regulation, and serving as a food source for many vertebrates (Jactel *et al.*, 2020). In the context of environmental disturbances, the conservation of insects is of paramount importance, as they serve as sensitive bioindicators of the quality of natural ecosystems and the impact of human intervention (Dubucq & Jacquemart, 2020; Sallé *et al.*, 2021).

Due to their bio-ecological characteristics and specialization, beetles have proven to be good indicators for revealing changes in environmental conditions (Davis *et al.*, 2001). Beetles constitute the most diverse and widespread group in the animal kingdom, with approximately 350,000 to 400,000 known species to date, representing about 40% of all insects and 25% of all known animals distribution (Delfosse, 2009; Tronquet, 2021). However, the information on the diversity and distribution of beetles in Morocco is less well known. A recent study in the Maamora forest (Habbaz *et al.*, 2025), which is part of the cork oak forest on the Atlantic coastal plain, provided an inventory of beetles. However, no study has focused on beetle diversity at the scale of the forested areas of the Larache cork oak forest. This study aims to establish a comprehensive inventory of beetles in the Larache cork oak forest. It is therefore necessary to conduct an exhaustive survey of beetles in the cork oak forest of Larache to identify species requiring urgent protection measures.

Materials and methods

Study area

The cork oak forest of Larache, located in the northwest region of Morocco (Fig. 1), forms a geographical unit centered around the Loukkos river plain, bordered to the north and south by the Sahel and R'Mel plateaus (Ballouche, 2013).

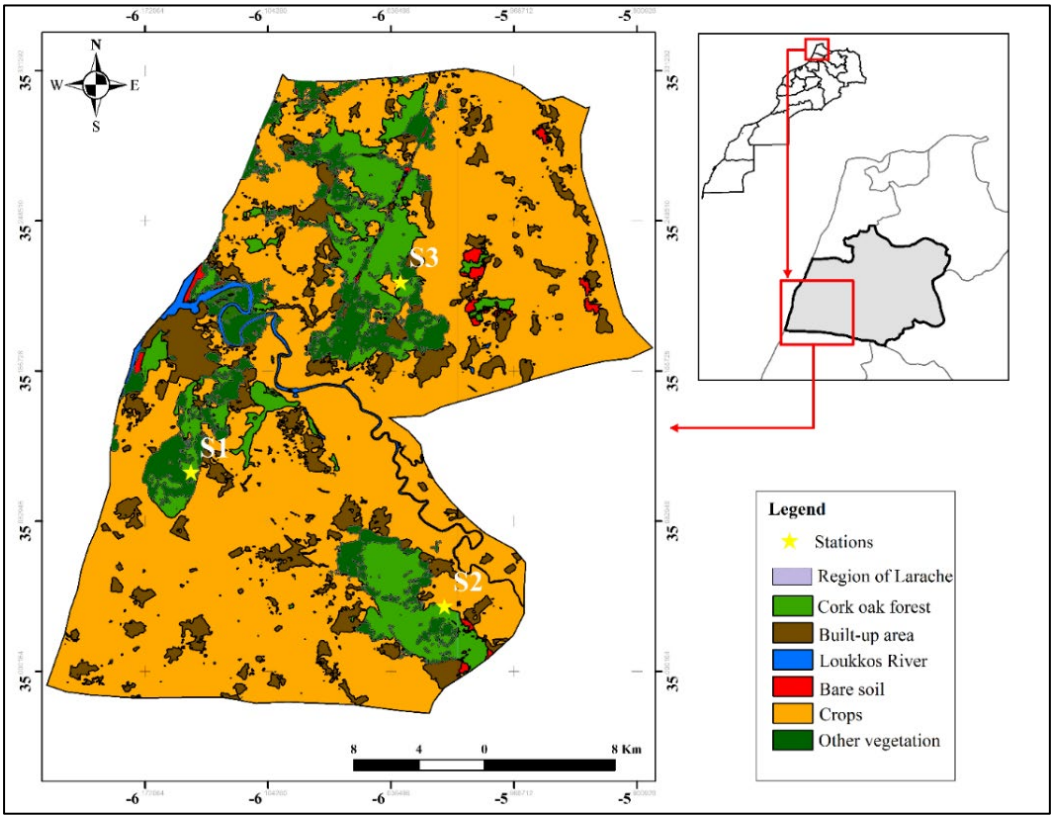

Fig. 1. Presentation of the study area and sampled stations.

The climate of the region is Mediterranean, with annual precipitation around 650 mm in Larache, falling mainly between October and May, with 4.5 dry months. Average temperatures are around 18°C, with the coldest month (January) having a minimum average temperature of 5.8°C. Bioclimatically, the region falls within the sub-humid thermomediterranean stage with mild to temperate winters. The prevailing winds are maritime winds from the west to southwest, but in summer, dry and hot continental winds (chergui) are not uncommon, leading to significant evapotranspiration (Ballouche, 2013). The regional vegetation largely consists of cork oak forests, classified as subhumid cork oak forests on sand (Sauvage, 1961). The main forest massif found here is the cork oak forest of Larache, extensively opened up by deforestation and grazing, locally replaced by reforestation with Eucalyptus, Pine and Acacia (Ballouche, 2024).

Description of stations

Three stations were selected within the cork oak forest based on their structure and vegetation (Table. 1).

Table 1. Description of the sampled stations.

Station	Locality	Geographic Coordinate	Description
Dense forest (S1)	Larache	35°11’40.9 N 06°07’34.9 W	A dense cork oak forest is distinguished by a closed canopy, varying amounts of deadwood, and an understory primarily composed of Cistaceae and herbaceous plant species (Fig. 2A).
Open forest (S2)	Zouada	35°03’20.2 N 6°01’48.0 W	A degraded cork oak forest bordered by forest tracks and located near cultivated fields. This forest is characterized by a sparse tree cover, often resulting from human activities such as logging and grazing, which reduce tree density and alter habitat structure (Fig. 2B).
Forest edge (S3)	Rissana	35°12’43.1 N 6°01’57.8 W	A flowering edge bordering a dense cork oak forest, characterized by a high diversity of flowering plants. This site benefits from the presence of permanent water resources, including a daya (and aquifer springs (Fig. 2C).

Fig. 2. Sampling stations. A. Dense forest (S1), B. Open forest (S2) and C. Forest edge (S3).

Sampling Methods

Various sampling methods were developed to study the diversity of beetles in the cork oak forest of Larache:

Pan traps

Coloured pan traps (yellow, white, orange, and blue) were installed to capture flower-visiting beetles (Nageleisen *et al.*, 2009). These colored pan traps had a diameter of 15 cm and a height of 13 cm. Each pan trap was filled halfway with water (60 %), detergent (20 %), and salt (20 %) mixture and fixed 1 meter above the ground. These bowls were distributed in four traps per station.

Barber pitfall

Six Barber pitfalls were constructed using plastic cups with a top diameter of 60 mm filled with water (60 %), detergent (20 %), and salt (20 %) and buried flush with the ground to capture species active on the soil surface (Nageleisen & Bouget, 2009).

Malaise trap

A Malaise trap was used to capture specific flying beetles (Ulyshen, 2005; Sheikh *et al.*, 2016), including various families such as Carabidae, Cerambycidae, Chrysomelidae, Curculionidae and Elateridae (Hutcheson, 1990). The Malaise traps were constructed of black and white material and handmade. Each trap measured approximately 1.5 meters in height, 1.2 meters in width, and 1.5 meters in length. The design of the trap is shown in the fig. 3. The traps were installed using stakes driven into the ground and secured with nets. The collection cups contained a solution of 50% ethanol, 5% detergent, and 45% water to preserve the captured specimens. In each station, 11 traps (six Barber pitfall, four Pan traps, and one Malaise trap) were installed and spaced at a distance of 15 to 20 meters apart.

Active trapping

Alongside the passive collection techniques described above, active searching was conducted for the direct capture of individuals, using a sweep net along straight transects (1 m x 100 m) in the sampled sites. We standardized our active searches by making consistent efforts at each site.

Each research session was conducted over a defined period of 8 hours within one day, with a uniform number of 3 researchers. Trap contents were collected every 20 days over 7 months (April-October) over two consecutive years (2021-2022).

Fig. 3. Installation and anchoring of the Malaise trap.

Specimen collection and identification

After each collection session, collected insects were individually placed in plastic vials, labeled, and preserved in 70% ethanol. These specimens were later examined in the laboratory, counted, and identified to species and/or genus level using a binocular microscope and various identification keys (Ferrer, 2009; Alonso, 2007; Baraud, 1992; Ehret, 1990; Delbol & Lempereur, 2014; Jeannel, 1941; Roger *et al.*, 2013; Brendell, 1975; Fadda, 2016; Lillig *et al.*, 2012; Charrier, 2002; Paulian, 1940; Secchi, 2002) and catalogues (Gommy *et al.*, 2011; Trócoli Gracia, 2018; 2019; 2020; 2023 and Carrillo, 2018). For species confirmation, they were compared to the specimens in the museum's collections of the CIRF (Center for Innovation, Research and Training) and the Museum of the Scientific Institute of Rabat (Morocco). The specimens were photographed using an Olympus Stereoscopic Zoom Trinocular Loupe (SZX2-ZB10).

Literature review and species selection

Distribution and endemism

To determine the distribution of captured species at the scale of the Palaearctic region and their endemism status in Morocco, we consulted the Catalogues of Palaearctic Coleoptera (Löbl & Smetana, 2003; 2004; 2006; 2007; 2008; 2011; 2013).

Rarity and threat status

The rarity and threat status of saproxylic species were determined by consulting the IUCN Red List of Threatened Species, the European Red List of Saproxylic Beetles (Cálix *et al.*, 2018), the Atlas of Threatened Invertebrates of Spain (Critically Endangered Species and Endangered Species) (Verdu & Galante, 2009), the Red List of Invertebrates of Spain (Verdu & Galante, 2006), the Red List of Mediterranean Saproxylic Beetles (García *et al.*, 2018) and the Red List of Coprophagous Beetles (Numa *et al.*, 2020).

Results

To date, this sampling has identified 180 species in this study, belonging to 37 families, among which: 9 are endemic, 33 species are new to Morocco, 13 saproxylic species and 10 are listed in the Red List, including 7 saproxylic species and 3 coprophagous species. The families and species are presented in alphabetical order (Table 2).

([E] endemic species, [N] species new to Morocco, [S] saproxylic species, [R] saproxylic species listed in the Red List of the Mediterranean region, [Rc] coprophagous species listed in the Red List of the Mediterranean region).

Class: Insecta Linnaeus, 1758

Order: Coleoptera Linnaeus, 1758

Family: Anthicidae Latreille, 1819

Hirticollis quadriguttatus (Rossi, 1792)

Material examined

Rissana, Forest edge, 35°12’43.1 N 6°01’57.8 W, 28.I.2021, 1 individual, pan traps, 04.VIII.2021, 4 individuals, pitfall trap, 27.IX.2022, 4 individuals, pitfall trap.

Collector name: Samih & Maatouf; Worldwide distribution: Europe, North Africa, Turkmenistan and Turkey (Chandler *et al.*, 2008).

Omonadus bifasciatus (Rossi, 1792)

Material examined

Rissana, Forest edge, 35°12’43.1 N 6°01’57.8 W, 15.IX.2021, 9 individuals, pitfall trap.

Collector name: Samih & Maatouf; Worldwide distribution Europe, Asia, Algeria, Morocco and Tunisia (Chandler *et al.*, 2008). Ecological insight: The adults are typically found on flowers, where they feed on pollen and nectar. This makes them minor pollinators in the ecosystems they inhabit. The larvae, however, are saprophagous, developing in decaying organic matter, including plant debris or decomposed wood, contributing to nutrient recycling (Telnov, 2010).

Omonadus floralis (Linnaeus, 1758)

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 15.IX.2021, 1 individual, pan traps.

Collector name: Samih; Worldwide distribution; Europe, Asia and North Africa (Chandler *et al.*, 2008).

Family: Brentidae Billberg, 1820

Apion frumentarium (Walton, 1844) [N]

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 29.IV.2021, 1 individual, pan traps.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 29.IV.2021, 2 individuals, pan traps.

Collector name; Samih & Maatouf; Worldwide distribution; Europe, Asia and Algeria (Sforzi, 2011).

Hemitrichapion reflexum (Gyllenhal, 1833) [N]

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 29.IV.2021, 1 individual, pan traps, 22.VI.2022, 2 individuals, pan traps.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 30.XII.2021, 1 individual, pan traps, 12.V.2022, 2 individuals, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: Europe, Asia and Algeria (Sforzi, 2011).

Family: Bruchidae Latreille, 1802

Bruchidius biguttatus (Olivier, 1795)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 28.X.2021, 2 individual, pan traps.

Collector name: Maatouf; Worldwide distribution: Europe, Asia and North Africa (Anton, 2010; Habbaz *et al.*, 2025).

Bruchidius bimaculatus (Olivier, 1795)

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 28.X.2021, 1 individual, pan traps. Collector name: Maatouf;

Worldwide distribution: Europe, Asia and North Africa (Anton, 2010).

Bruchidius foveolatus (Gyllenhal, 1833)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 27.V.2021, 1 individual, pan traps, 28.X.2021, 1 individual, pan traps, 12.V.2022, 2 individual, pan traps.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 01.VII.2021, 1 individual, pan traps, 28.X.2021, 1 individual, pan traps, 30.XII.2021, 1 individual, pan traps. Collector name: Samih & Maatouf; Worldwide distribution: Europe, Asia and North Africa (Anton, 2010).

Family: Buprestidae Leach, 1815

Acmaeodera adsperula (Illiger, 1803) [S]

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 01.VII.2021, 2 individuals, pan traps, 15.IX.2021, 1 individual, pan traps, 22.VI.2022, 1 individual, Pitfall trap.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 01.VI.2022, 3 individuals, pitfall trap, 22.VI.2022, 1 individual, pitfall trap.

Collector name: Samih, Maatouf & Habbaz; Worldwide distribution: Europe, Asia, Morocco, Algeria and Tunisia (Villemant & Fraval, 1993; Volkovitsh, 2006; Habbaz *et al.*, 2025).

Ecological insight

This species is commonly associated with woody plants, especially oak trees, where its larvae develop within the decaying wood, contributing to nutrient cycling within forest ecosystems. This behavior is characteristic of many wood-boring beetles, including those in the genus Acmaeodera (Alizadeh *et al.*, 2024).

Acmaeodera discoida (Fabricius, 1787)

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 01.VI.2022, 1 individual, pitfall trap; Collector name: Samih;

Worldwide distribution: Europe, North Africa, Syria and Israël (Volkovitsh, 2006; Habbaz *et al.*, 2025).

Acmaeodera lanuginosa (Gyllenhall, 1817)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 01.VI.2022, 1 individual, pan traps.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 01.VII.2021, 3 individuals, pan traps, 01.VII.2021, 1 individual, pitfall trap, 27.V.2021, 5 individuals, pan traps, 04.VIII.2021, 1 individual, pan traps, 29.IV.2022, 3 individuals, pan traps, 12.V.2022, 1 individual, pitfall trap, 01.VI.2022, 6 individuals, pitfall trap, 22.VI.2022, 1 individual, pan traps. Collector name Samih: Maatouf & Habbaz; Worldwide distribution: Europe, Morocco, Algeria, Tunisia, Sinai and Israel (Volkovitsh, 2006; Habbaz *et al.*, 2025).

Agrilus biguttatus (Fabricius, 1777) [S]

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 12.V.2022, 1 individual, malaise trap. Collector name**:** Samih; Worldwide distribution Europe, Iran, Syria, Algeria and Morocco (Jendek, 2006; Habbaz *et al.*, 2025).

Agrilus graminis mamorensis (Théry, 1930) [E] [S]

Material examined

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 27.V.2021, 3 individuals, pan traps; Collector name; Samih; Worldwide distribution: Morocco (Jendek, 2006; Habbaz *et al.*, 2025).

Anthaxia millefolii polychloros (Abeille de Perrin, 1894)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 27.V.2021, 2 individuals, pan traps, 01.VI.2022, 1 individual, pan traps.

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 01.VII.2021, 1 individual, pan traps.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 29.IV.2021, 1 individual, pan traps, 27.V.2021, 3 individuals, pan traps, 04.VIII.2021, 2 individuals, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: Europe and North Africa (Bily, 2006; Habbaz *et al.*, 2025).

Anthaxia scutellaris atlasica (Théry, 1930) (Fig. 4B)

Material examined

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 29.IV.2021, 1 individual, pan traps.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 01.VI.2022, 7 individuals, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: Algeria, Tunisia and Morocco (Bily, 2006).

Anthaxia umbellatarum umbellatarum (Fabricius, 1787) (Fig. 4A)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 22.IV.2021, 1 individual, pan traps.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 29.IV.2021, 1 individual, pan traps, 27.V.2021, 1 individual, pan traps, 01.VII.2021, 2 individuals, pan traps, 15.IX.2021, 3 individuals, pitfall trap, 01.VI.2022, 1 individual,

pan traps, 21.VII.2022, 2 individuals, pan traps, 27.IX.2022, 3 individuals, pan traps; Collector name: Samih, Maatouf & Habbaz; Worldwide distribution: Europe, Asia and North Africa (Bily, 2006; Habbaz *et al.*, 2025).

Habroloma triangulare (Lacordaire, 1835)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 12.V.2022, 2 individuals, pan traps, 27.IX.2022, 2 individuals, pan traps; Collector name Samih; Worldwide distribution: Spain, France, Italy, Portugal, Algeria, Tunisia and Morocco (Kuban, 2006; Habbaz *et al.*, 2025).

Family: Carabidae Latreille, 1802

Acupalpus brunnipes (Sturm, 1825)

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 01.VI.2022, 1 individual, pan traps, 22.VI.2022, 1 individual pan traps; Collector name: Samih; Worldwide distribution: Europe, Algeria, Tunisia, Morocco and Turkey (Jaeger & Kataev, 2003).

Agonum emarginatum (Gyllenhal, 1827) [N]

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 12.V.2022, 4 individuals, pan traps, 22.VI.2022, 4 individuals, pan traps; Collector name Samih & Maatouf; Worldwide distribution Europe (Bousquet, 2003a).

Bembidion biguttatum **(Fabricius, 1779)** (Fig. 4F) [N]

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 27.V.2021, 1 individual, pan traps; Collector name**:** Samih; Worldwide distribution: Europe, Asia and Canary Islands (Marggi *et al.*, 2003). Worldwide distribution**:** The adults of *Bembidion* genus, as predators of small arthropods, contribute to maintaining the balance of invertebrate communities by regulating the populations of certain species (Ekschmitt *et al.*, 1997; Staudacher *et al.*, 2024).

Bembidion bipunctatum laevifrons (Schaufuss, 1882)

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 27.V.2021, 1 individual, pan traps; Collector name Maatouf; Worldwide distribution Spain, Portugal and Morocco (Marggi *et al.*, 2003).

Bradycellus verbasci (Duftschmid, 1812)

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 27.IX.2022, 2 individuals, pan traps; Collector name Maatouf; Worldwide distribution Europe, Asia and North Africa (Bousquet, 2003a).

Carterus rotundicollis (Rambur, 1837)

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 29.IV.2021, 1 individual, pan traps; Collector name: Samih; Worldwide distribution: Europe, Algeria, Tunisia and Morocco (İto, 2003).

Cincidela Moroccana (Fabricius, 1801) (Fig. 4E)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 28.10.2021, 1 individual, pitfall trap; Collector name Samih; Worldwide distribution: Portugal, Spain, Tunisia and Morocco (Puchkov & Matalin, 2003; Habbaz *et al.*, 2025).

Cymindis lineola (L. Dufour, 1820) (Fig. 4I) [N]

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 01.VI.2022, 1 individual, pitfall trap.

Rissana, Open forest, 35°10'48.0 N 5°58'40.1 W, 28.X.2021, 1 individual, pitfall trap; Collector name: Samih & Maatouf; Worldwide distribution: Europe and Tunisia (Kabak, 2003).

Cymindis platicollis (Say, 1823) [N]

Material examined

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 07.VI.2021, 2 individus, pan traps; Collector name Samih; Worldwide distribution: Canada and Mexico (Arce-Pérez *et al.*, 2018).

Harpalus attenuatus (Stephens, 1828)

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 01.VII.2021, 1 individual, pan traps, 15.IX.2021, 3 individuals, pitfall trap, 28.X.2021, 5 individuals, pitfall trap; Collector name: Samih & Maatouf; Worldwide distribution: Europe, Asia and North Africa (Kataev *et al.*, 2003; Habbaz *et al.*, 2025).

Microlestes abeillei brisouti (Holdhaus, 1912)

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 12.V.2022, 3 individuals, pan traps, 01.VI.2022, 1 individual, pan traps; Collector name Samih & Maatouf; Worldwide distribution North Africa (Kabak, 2003; Habbaz *et al.*, 2025).

Ophonus ardosiacus (Lutshnik, 1922)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 01.VI.2022, 1 individual, pan traps, 12.V.2022, 1 individual, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: Europe, North Africa and Turkey (Kataev *et al.*, 2003).

Ophonus subquadratus (Dejean, 1829) [N]

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 12.V.2022, 8 individuals, pan traps; Collector name: Maatouf; Worldwide distribution: Europe, Asia, Algeria and Libya (Kataev *et al.*, 2003).

Paradromius linearis (Olivier, 1795) (Fig. 4D)

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 28.10.2021, 1 individual, pan traps; Collector name: Samih; Worldwide distribution: Europe, Asia and North Africa (Kabak, 2003; Habbaz *et al.*, 2025).

Philorhizus notatus (Stephens, 1827) [N]

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 01.VI.2022, 1 individual, pan traps; Collector name Samih; Worldwide distribution: Europe and Asia (Kabak, 2003).

Pterostichus elongatus (Duftschmid, 1812)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 28.X.2021, 3 individuals, pitfall trap, 01.VI.2022, 5 individuals, pitfall trap, 22.VI.2022, 12 individuals, pitfall trap, 27.IX.2022, 2 individuals, pitfall trap, 30.12.2022, 5 individuals, pitfall trap.

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 07.VII.2021, 5 individuals, pitfall trap, 28.X.2021, 20 individuals, pitfall trap, 30.XII.2021, 6 individuals, pitfall trap.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 30.XII.2021, 3 individuals, pitfall trap, 12.V.2022, 5 individuals, pitfall trap, 22.VI.2022, 1 individuals, pitfall trap; Collector name: Samih, Maatouf & Habbaz; Worldwide distribution: Europe, Morocco, Afghanistan, Kazakhstan and Turkey (Bousquet, 2003b; Habbaz *et al.*, 2025).

Scarites terricola terricola (Bonelli, 1813) (Fig. 4C)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 12.V.2022, 1 individual, pitfall trap, 01.VI.2022, 4 individuals, pitfall trap, 22.VI.2022, 2 individuals, pitfall trap; Collector name: Samih & Maatouf; Worldwide distribution: Europe, Asia and North Africa (Balkenohl, 2003; Habbaz *et al.*, 2025).

Singilis soror soror (Rambur, 1837)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 15.IX.2021, individual, pan traps, 21.VII.2022, 1 individual, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: Spain, Algeria and Morocco (Kabak, 2003).

Stenolophus abdominalis abdominalis (Gene, 1836)

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 01.VII.2021, 2 individuals, pan traps, 12.V.2022, 5 individuals, pan traps, 21.VII.2022, 7 individuals, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: France, Italy, Portugal, Spain, North Africa and Saudi Arabia (Jaeger & Kataev, 2003).

Stenolophus teutonus (Schrank, 1781)

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 27.IX.2022, 6 individuals, pan traps; Collector name: Samih; Worldwide distribution: Europe, Asia and North Africa (Jaeger & Kataev, 2003).

Syntomus foveatus (Geoffroy, 1785)

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 22.VI.2022, 3 individuals, pan traps; Collector name Samih; Worldwide distribution**:** Europe, Asia and North Africa (Kabak, 2003; Habbaz *et al.*, 2025).

Family: Cerambycidae Latreille, 1802

Agapanthia irrorata (Fabricius, 1787)

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 12.V.2022, 1 individual, malaise trap; Collector name: Maatouf; Worldwide distribution: France, Italy, Spain, Portugal, Algeria, Morocco and Tunisia (Sama, 2010).

Alocerus moesiacus (Frivaldszky, 1837) (Fig. 4J)

Material examined

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 01.VII.2021, 2 individuals, pan traps.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 01.VI.2022, 1 individual, pitfall trap; Collector name: Samih & Maatouf; Worldwide distribution: Europe, Asia, Algeria, Morocco and Tunisia (Sama, 2010).

Certallum ebulinum (Linné, 1767)

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 12.V.2022, 2 individuals, malaise trap; Collector name**:** Maatouf; Worldwide distribution; Europe, Asia and North Africa (Sama, 2010).

Chlorophorus favieri (Farimaire, 1873) (Fig. 4G) [E] [R]

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 01.VII.2021, 1 individual, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: Morocco (Sama, 2010); Ecological insight: The larvae of *C. favieri* are saproxylic, develop in the dying branches of oaks (Sama, 1987).

Phytoecia coerulescens (Scopoli, 1763)

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 12.V.2022, 1 individual, malaise trap; Collector name: Samih; Worldwide distribution: Europe, Asia, Algeria, Morocco and Tunisia (Sama, 2010).

Oxypleurus nodieri (Mulsant, 1839)

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 04.VIII.2021, 1 individual, pan traps; Collector name: Samih; Worldwide distribution: Europe, North Africa and Turkey (Sama, 2010).

Stenurella approximans (Rosenhauer, 1856)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 27.V.2021, 1 individual, pan traps, 01.VI.2022, 2 individuals, pan traps.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 15.V.2022, 2 individuals, malaise trap, 01.VI.2022, 2 individuals, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: Portugal, Spain and Morocco (Sama, 2010).

Stictoleptura fontenayi (Mulsant & Rey, 1839)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 27.V.2021, 1 individual, pan traps; Collector name: Maatouf; Worldwide distribution: Europe, Algeria, Morocco and Tunisia (Sama, 2010).

Trichoferus ilicis (Sama, 1987) [E] [R]

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 28.X.2021, 1 individual, pan traps.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 15.IX.2021, 5 individuals, pan traps, 28.X.2021, 2 individuals, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: Morocco (Sama, 2010; Habbaz *et al.*, 2025).

Family: Chrysomelidae Latreille, 1802

Aphthona euphorbiae (Schrank, 1781)

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 29.IV.2021, 1 individual, pan traps; Collector name: Maatouf; Worldwide distribution: Europe, Asia and North Africa (Kippenberg, 2010).

Cassida vittata (Villers, 1789)

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 27.V.2021, 2 individuals, pan traps, 01.VII.2021, 11 individuals, pan traps, 30.XII.2021, 4 individuals, pan traps, 01.VI.2022, 2 individuals, pan traps, 22.VI.2022, 4 individuals, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: Europe, Asia and North Africa (Borowiec & Sekerka, 2010).

Chrysolina bankii (Fabricius, 1775)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 27.V.2021, 1 individual, pan traps; Collector name: Samih; Worldwide distribution: Europe and North Africa (Kippenberg, 2010).

Chrysolina diluta (Germar, 1823) [N]

Material examined

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 30.XII.2021, 1 individual, pitfall trap; Collector name: Maatouf; Worldwide distribution: France, Spain and Portugal (Kippenberg, 2010).

Cryptocephalus fulvus (Goeze, 1777) [N]

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 29.IV.2021, 1 individual, pan traps.

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 29.IV.2021, 1 individual, pan traps; Collector name: Samih & Habbaz; Worldwide distribution: Europe, Kazakhstan, Tajikistan and Russia (Lopatin *et al.*, 2010).

Cryptocephalus numidicus (Bourdonné, 1876)

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 15.IX.2021, 1 individual, direct surveys; Collector name: Habbaz; Worldwide distribution: Algeria, Morocco and Tunisia (Lopatin *et al.*, 2010). Ecological insight: Genus *Cryptocephalus* have unique ecological habits: larvae feed on dead vegetable material and case-bearer females envelop surface of eggs with their excrement (Kang & Lee, 2017).

Longitarsus aeneus (Kutschera, 1862)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 27.V.2021, 1 individual, pan traps.

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 29.IV.2021, 2 individuals, pan traps.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 30.XII.2021, 2 individuals, pan traps, 01.VI.2022, 2 individuals, malaise trap, 22.VI.2022, 2 individuals, malaise trap, 27.IX.2022, 1 individual, pan traps. Collector name: Samih, Maatouf & Habbaz; Worldwide distribution: Europe, North Africa, Syria, Yemen and Jordan (Doberl, 2010).

Longitarsus ochroleucus (Marsham, 1802)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 04.VIII.2021, 1 individual, pan traps.

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 04.VIII.2021, 13 individuals, pan traps, 22.VI.2022, 2 individuals, pan traps; Collector name: Samih & Maatouf; Worldwide distribution Europe, North Africa, China and Turkey (Doberl, 2010).

Oulema melanopus (Linnaeus, 1758)

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 27.V.2021, 1 individual, pan traps; Collector name: Samih; Worldwide distribution: Europe, Asia and North Africa (Schmitt, 2010).

Psylliodes cuprea (Koch, 1803)

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 22.VI.2022, 1 individual, pan traps, 27.IX.2022, 1 individual, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: Europe, Asia, Algeria, Morocco and Tunisia (Doberl, 2010).

Family: Coccinelidae Latreille, 1807

Adalia decempunctata (Linnaeus, 1758)

Material examined

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 04.VIII.2021, 1 individual, pan traps; Collector name Samih; Worldwide distribution Europe, Asia and North Africa (Kovar, 2007; Habbaz *et al.*, 2025).

Chilocorus bipustulatus (Linnaeus, 1758)

Material examined

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 01.VII.2021, 1 individual, pan traps; Collector name: Maatouf; Worldwide distribution: Europe, Asia and North Africa (Kovar, 2007).

Coccinella septempunctata (Linnaeus, 1758)

Material examined

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 27.V.2021, 1 individual, pan traps; Collector name: Samih; Worldwide distribution: Italy and North Africa (Kovar, 2007).

Oenopia conglobata (Linnaeus, 1758) (Fig. 4L)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 01.VI.2022, 1 individual, pan traps.

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 28.X.2021, 3 individuals, pan traps.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 04.VIII.2021, 1 individual, pan traps; Collector name**:** Samih, Maatouf & Habbaz; Worldwide distribution: Europe, Asia (Kovar, 2007) and Morocco (Benyahia *et al.*, 2016; Habbaz *et al.*, 2025); Ecological insight: Both the adult and larval stages of *O. conglobata* are predatory, primarily feeding on aphids, which are their main food source. They are effective natural pest controllers in ecosystems where aphids are prevalent (Lumbierres *et al.*, 2018).

Oenopia lyncea lyncea (Olivier, 1808)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 27.V.2021, 1 individual, pan traps, 01.VI.2022, 2 individuals, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: France, Italy, Portugal, Spain, Algeria, Morocco and Tunisia (Kovar, 2007; Habbaz *et al.*, 2025).

Platynaspis luteorubra (Goeze, 1777)

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 04.VIII.2021, 1 individual, pan traps; Collector name: Maatouf; Worldwide distribution: Europe, Asia and North Africa (Kovar, 2007; Habbaz *et al.*, 2025).

Rhyzobius litura (Fabricius, 1787)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 12.V.2022, 1 individual, pan traps.

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 01.VII.2021, 1 individual, pan traps, 04.VIII.2021, 1 individual, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: Europe, North Africa and Turkey (Kovar, 2007; Habbaz *et al.*, 2025).

Rhyzobius lophantae (Blaisdell, 1892)

Material examined

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 04.VIII.2021, 1 individual, pan traps.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 15.IX.2021, 1 individual, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: Europe, North Africa, Iran, Inde and Turkey (Kovar, 2007).

Rodolia cardinalis (Mulsant, 1850) (Fig. 4K)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 12.V.2022, 1 individual, pan traps.

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 01.VII.2021, 1 individual, pan traps.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 04.VIII.2021, 1 individual, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: Europe, Asia and North Africa (Kovar, 2007; Habbaz *et al.*, 2025).

Scymnus abiandis (Paykull, 1798) [N]

Material examined

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 01.VII.2021, 1 individual, pan traps; Collector name: Samih; Worldwide distribution: Europe and Asia (Kovar & Smetana, 2007).

Scymnus apandzi (Mulsant, 1846) [N]

Material examined

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 04.VIII.2021, 3 individuals, pan traps.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 15.IX.2021, 1 individual, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: Europe and Asia (Kovar, 2007).

Scymnus impexus (Mulsant, 1850) [N]

Material examined

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 01.VII.2021, 4 individuals, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: Europe and China (Kovar, 2007).

Scymnus interruptus (Goeze, 1777)

Material examined

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 01.VII.2021, 1 individual, pan traps.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W,28.X.2021, 1 individual, pan traps; Collector name: Samih & Maatouf; Worldwide distribution Europe, Asia and North Africa (Kovar, 2007).

Scymnus subvillosus (Goeze, 1777)

Material examined

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 04.VIII.2021, 1 individual, pan traps; Collector name: Samih; Worldwide distribution: Europe, Asia and North Africa (Kovar, 2007; Habbaz *et al.*, 2025).

Scymnus suturalis (Westman, 1795) [N]

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 21.VII.2022, 1 individual, pan traps; Collector name: Samih; Worldwide distribution: Europe, Asia, Algeria, Madeira Islands and Tunisia (Kovar, 2007).

Standhorus punctillum (Weise, 1891)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 04.VIII.2021, 1 individual, pan traps, 12.V.2022, 2 individuals, pan traps, 01.VI.2022, 1 individual, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: Europe, Asia, Egypt and Morocco (Kovar, 2007).

Family: Corylophidae LeConte, 1852

Arthrolips convexiuscula (Motschulsky, 1849)

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 22.VI.2022, 3 individuals, pan traps; Collector name: Samih; Worldwide distribution: Europe, Asia and North Africa (Bowestead, 2007).

Family: Curculionidae Latreille, 1802

Brachyderes incanus (Linné, 1758)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 29.IV.2021, 2 individuals, pan traps, 12.V.2022, 1 individual, pan traps.

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W,28.X.2021, 1 individual, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: Europe, Japan (Pellandier, 2013) and Morocco (Arahou, 2008).

Brachyderes pubescens (Boheman, 1833)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 27.IX.2022, 3 individuals, pan traps.

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 04.VIII.2021, 1 individual, pan traps.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 29.IV.2021, 1 individual, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: Spain, Portugal, France, Italy, Algeria and Morocco (Pellandier, 2013; Habbaz *et al.*, 2025).

Brachytemnus porcatus (Germar, 1823)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 12.V.2022, 1 individual, pan traps, 01.VI.2022, 2 individuals, pan traps.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 29.IV.2021, 1 individual, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: Europe, Algeria, Morocco, Lebanon, Syria, Turkey and Cyprus (Hlavac & Maughan, 2013).

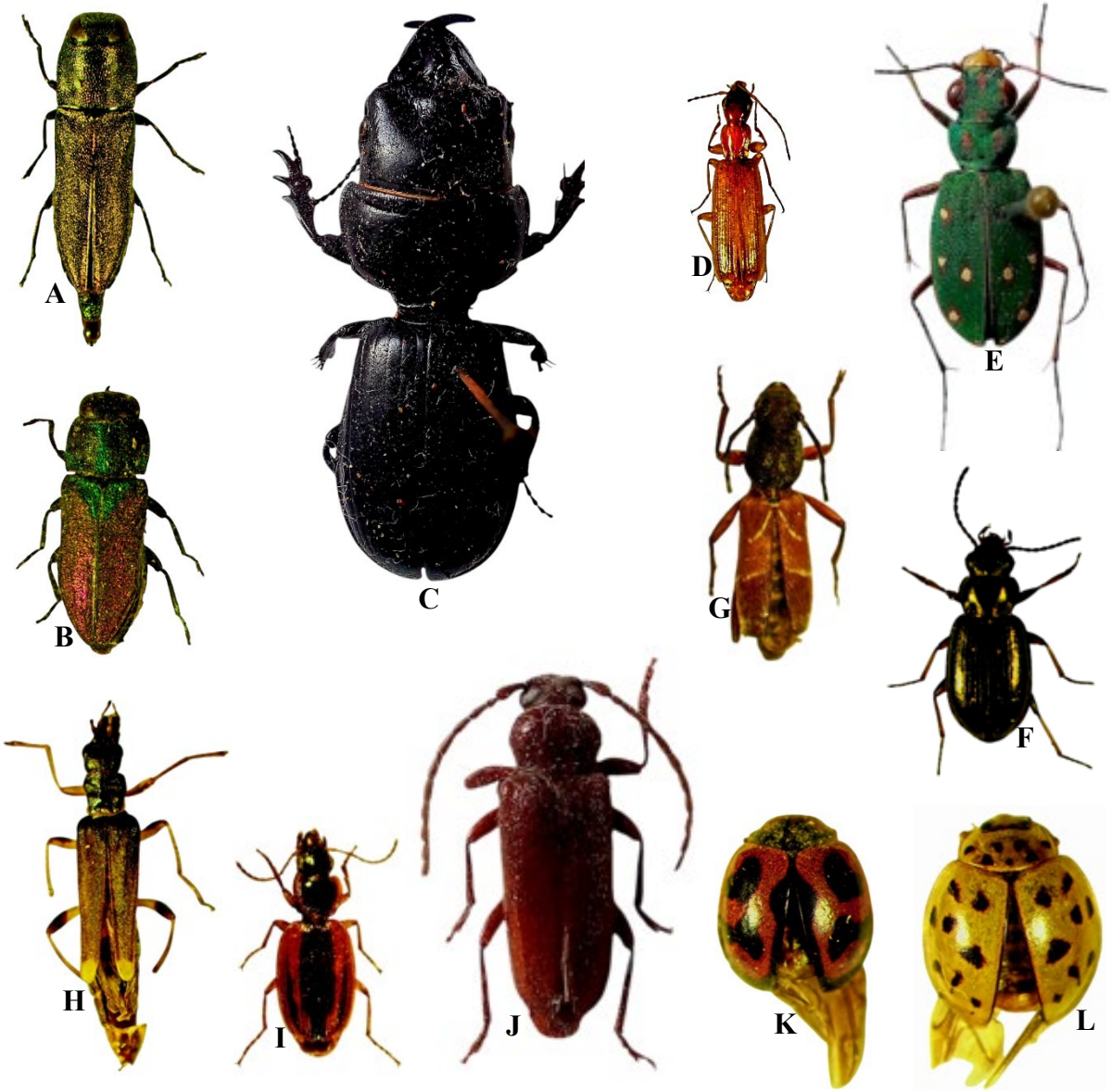

Fig. 4. The beetles associated with the Larache cork oak forest. A. *Anthaxia umbellatarum umbellatarum* (Fabricius, 1787), B. *Anthaxia scutellaris atlasica* (Théry, 1930), C. *Scarites terricola terricola* (Bonelli, 1813), D. *Paradromius linearis* (Olivier, 1795), E. *Cicindela maroccana* Fabricius, 1801, F. *Bembidion biguttatum* (Fabricius, 1779), G. *Chlorophorus favieri* (Farimaire, 1873), H. *Oedemera barbara* (Fabricius, 1792), I. *Cymindis lineola* (L. Dufour, 1820), J. *Alocerus moesiacus* (Frivaldszky, 1837), K. *Rodolia cardinalis* (Mulsant, 1850), L. *Oenopia conglobata* (Linnaeus, 1758) (photos by A. Samih and N. Maatouf).

Ceutorhynchus pallidactylus (Marsham, 1802)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 27.IX.2022, 1 individual, pan traps; Collector name Maatouf; Worldwide distribution Europe, Asia, and North Africa (Colonnelli, 2013).

Coeliodes ruber (T.Marsham, 1802)

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 01.VI.2022, 2 individuals, pan traps; Collector name: Maatouf; Worldwide distribution: Europe, Algeria, Morocco, Syria and Israel (Colonnelli, 2013; Habbaz *et al.*, 2025).

Lixus juncii (Boheman, 1835) [N]

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 29.IV.2021, 1 individual, pan traps.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 15.IX.2021, 2 individuals, pan traps, 27.IX.2022, 2 individuals, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: Europe, Algeria, Madeira Islands, Egypt, Syria, Iraq, Jordan, Cyprus and Turkey (Gultekin & Fremuth, 2013).

Microplontus rugulosus (J.F.W.Herbst, 1795)

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 27.IX.2022, 1 individual, pan traps; Collector name: Maatouf; Worldwide distribution: Europe, Asia and North Africa (Caldara, 2013).

Orchestes irroratus maroccanus (Roudier, 1954)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 12.V.2022, 1 individual, pan traps, 01.VI.2022, 1 individual, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: Algeria, Morocco and Tunisia (Villemant & Fraval, 1993; Caldara, 2013).

Sitona callosus (Gyllenhal, 1834) [N]

Material examined

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 30.XII.2021, 1 individual, pan traps; Collector name: Samih; Worldwide distribution: Europe and Asia (Velazquez de castro, 2013).

Sitona lineatus (Linnaeus, 1758) [N]

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 12.V.2022, 2 individuals, pan traps, 01.VI.2022, 2 individuals, pan traps, 21.VII.2022, 1 individual, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: Europe North Africa and Asia (Velazquez de castro, 2013).

Sitona lineellus (Bonsdorff, 1785) [N]

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 15.IX.2021, 2 individuals, pan traps; Collector name: Samih;

Worldwide distribution: Europe and Asia (Velazquez de castro, 2013).

Sitona longulus (Gyllenhal, 1834) [N]

Material examined

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 15.IX.2022, 1 individual, pan traps.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 15.IX.2021, 1 individual, pan traps; Collector name Samih & Maatouf; Worldwide distribution Europe and Asia (Velazquez de castro, 2013).

Tychius cuprifer (Panzer, 1799)

Material examined

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 04.VIII.2021, 1 individual, pan traps; Collector name: Samih; Worldwide distribution: Europe, Algeria, Morocco and Asia (Caldara, 2013).

Tychius pusillus (Germar, 1842)

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 01.VII.2021, 2 individuals, pan traps, 01.VI.2022, 1 individual, pan traps, 22.VI.2022, 1 individual, pan traps, 22.VI.2022, 2 individuals, malaise trap; Collector name: Samih & Maatouf; Worldwide distribution: Europe, Algeria and Morocco (Caldara, 2013).

Family: Dasytidae Laporte, 1840

Dasytes nigroaeneus (Küster, 1850)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 29.IV.2021, 38 individuals, pan traps, 27.V.2021, 8 individuals, pan traps, 01.VII.2021, 5 individuals, pan traps, 12.V.2022, 24 individuals, pan traps, 12.V.2022, 2 individuals, malaise trap , 01.VI.2022, 12 individuals, pan traps.

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 29.IV.2021, 12 individuals, pan traps, 27.V.2021, 2 individuals, pan traps.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W,20.IV.2021, 31 individuals, pan traps, 27.V.2021, 46 individuals, pan traps, 01.VII.2021, 12 individuals, pan traps, 12.V.2022, 95 individuals, pan traps, 01.VI.2022, 41 individuals, pan traps, 22.VI.2022, 12 individuals, pan traps; Collector name: Samih, Maatouf & Habbaz; Worldwide distribution: Europe, Syria, Algeria and Morocco (Mayor, 2007a; Habbaz *et al.*, 2025).

Dasytes terminalis (Jacquelin du Val, 1863)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 29.IV.2021, 8 individuals, pan traps, 27.V.2021, 8 individuals, pan traps, 01.VII.2021, 2 individuals, pan traps, 12.V.2022, 10 individuals, pan traps, 12.V.2022, 4 individuals, malaise trap, 01.VI.2022, 50 individuals, pan traps, 22.VI.2022, 8 individuals, pan traps.

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 27.V.2021, 2 individuals, pan traps, 01.VII.2021, 1 individual, pan traps, 04.VIII.2021, 1 individual, pitfall trap, 30.XII.2021, 1 individual, pan traps.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 29.IV.2021, 12 individuals, pan traps, 27.V.2021, 9 individuals, pan traps, 01.VII.2021, 7 individuals, pan traps, 12.V.2022, 48 individuals, pan traps, 01.VI.2022, 18 individuals, pan traps, 01.VI.2022, 4 individuals, malaise trap, 22.VI.2022, 3 individuals, pan traps, 21.VII.2022, 1 individual, pan traps; Collector name: Samih, Maatouf & Habbaz; Worldwide distribution: France, Portugal, Spain, Algeria and Morocco (Mayor, 2007a; Bellifa & Roussand, 2021; Habbaz *et al.*, 2025).

Family: Dermestidae Latreille, 1804

Anthrenus flavipes (LeConte, 1854)

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 22.VI.2022, 3 individuals, pan traps, 21.VII.2022, 1 individual, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: Europe, Asia, Egypt, Tunisia and Morocco (Hava, 2007b).

Anthrenus fuscus (Olivier, 1790)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 01.VI.2022, 1 individual, pan traps.

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 27.V.2021, 1 indivdu, pan traps.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 01.VI.2022, 2 individuals, pan traps, 22.VI.2022, 2 individuals, pan traps, 21.VII.2022, 2 individuals, pan traps; Collector name Samih & Maatouf; Worldwide distribution Europe and Morocco (Hava, 2007b).

Anthrenus museorum (Linnaeus, 1761)

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 01.VI.2022, 1 individual, pan traps; Collector name: Maatouf; Worldwide distribution: Europe, Asia and North Africa (Hava, 2007b; Habbaz *et al.*, 2025).

Anthrenus pimpinellae (Fabricius, 1775)

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 27.V.2021, 1 individual, pan traps; Collector name: Samih; Worldwide distribution: Europe, Asia, Egypt and Morocco (Hava, 2007b; Habbaz *et al.*, 2025).

Attagenus bifasciatus (Fabricius, 1787)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 12.V.2022, 7 individuals, pan traps.

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 27.V.2021, 1 individual, pan traps.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 27.V.2021, 6 individuals, pan traps, 21.VII.2021, 6 individuals, pan traps, 12.V.2022, 6 individuals, pan traps, 01.VI.2022, 19 individuals, pan traps, 22.VI.2022, 6 individuals, pan traps; Collector name: Samih, Maatouf & Habbaz; Worldwide distribution: Europe, Asia and North Africa (Hava, 2007b).

Dermestes frischii (Kugelann, 1792)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 01.VI.2022, 2 individuals, pitfall trap.

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 01.VII.2021, 2 individuals, pitfall trap, 04.VIII.2021, 1 individual, pan traps.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 01.VII.2021, 4 individuals, pitfall trap, 21.VII.2022, 2 individuals, pan traps; Collector name: Samih, Maatouf & Habbaz; Worldwide distribution: Europe, Asia and North Africa (Hava, 2007a; Habbaz *et al.*, 2025); Ecological insight Is a necrophagous species, helps accelerate the breakdown of dead organisms, returning valuable nutrients to the soil (Farag *et al.*, 2021).

Orphilus niger (Rossi, 1790)

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 22.VI.2022, 1 individual, pan traps; Collector name: Samih; Worldwide distribution: Europe, Uzbekistan, Tajikistan and North Africa (Hava, 2007a).

Trogoderma granarium (Everts, 1898)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 29.IV.2021, 2 individuals, pan traps, 12.V.2022, 2 individuals, pan traps.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 12.V.2022, 1 individual, pitfall trap; Collector name**:** Samih & Maatouf; Worldwide distribution: Europe, Asia, Egypt, Tunisia and Morocco (Hava, 2007a).

Family: Dryopidae Billberg, 1820

Dryops luridus (Erichson, 1847) [N]

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 30.XII.2021, 1 individual, pan traps; Collector name: Samih; Worldwide distribution: Europe, Turkey and North Africa except Morocco (Kodada & Jäch, 2006).

Family: Elateridae Leach, 1815

Cardiophorus rufipes (Buysson, 1902) [S]

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 01.VI.2022, 2 individuals, pan traps.

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 29.IV.2021, 2 individuals, pan traps, 27.V.2021, 3 individuals, pan traps.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 01.VII.2021, 3 individuals, pan traps, 01.VI.2022, 3 individuals, pan traps; Collector name: Samih, Maatouf & Habbaz; Worldwide distribution: Europe, Asia and North Africa (Cate, 2007) and Morocco (Habbaz *et al.*, 2025).

Drasterius bimaculatus (Rossi, 1790) [S]

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 15.IX.2021, 1 individual, pan traps, 30.XII.2021, 2 individuals, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: Europe, North Africa, Asia and Morocco (Cate, 2007).

Family: Erotylidae Latreille, 1802

Triplax lacordairei (Crotch, 1870) (Fig. 5I) [R]

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 12.V.2022, 1 individual, pan traps; Collector name: Samih; Worldwide distribution: Europe, Algeria and Morocco (Wegrzynowiez, 2007a).

Family: Geotrupidae Latreille, 1802

Thorectes distinctus (Marseul, 1878) (Fig. 5E)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 01.VII.2021, 11 individuals, pitfall trap, 12.V.2022, 20 individuals, pitfall trap, 01.VI.2022, 24 individuals, pitfall trap, 22.VI.2022, 13 individuals, pitfall trap, 21.VII.2022, 5 individuals, pitfall trap, 27.IX.2022, 1 individual, pitfall trap, 30.XII.2022, 57 individuals, pitfall trap.

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 15.IX.2021, 2 individuals, pitfall trap, 28.X.2021, 5 individuals, pitfall trap, 30.XII.2021, 58 individuals, pitfall trap.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 12.V.2022, 11 individuals, pitfall trap, 01.VI.2022, 8 individuals, pitfall trap; Collector name: Samih, Maatouf & Habbaz; Worldwide distribution: Algeria and Morocco (Löbl *et al.*, 2006; Habbaz *et al.*, 2025).

Typhaeus typhoeus (Linnaeus, 1758)

Material examined

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 30.XII.2021, 1 individual, pitfall trap; Collector name: Maatouf; Worldwide distribution: Europe and Morocco (Löbl *et al.*, 2006; Habbaz *et al.*, 2025).

Family: Glaphyridae Macleay, 1819

Anthypna meles (Fabricius, 1792)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 22.VI.2022, 1 individual, pan traps.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 22.VI.2022, 1 individual, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: Algeria, Tunisia and Morocco (Nikodym & Bezdek, 2006; Habbaz *et al.*, 2025).

Eulasia goudoti (Laporte, 1840) [E]

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 29.IV.2021, 4 individuals, pan traps, 01.VI.2022, 9 individuals, pan traps, 01.VI.2022, 3 individuals, pitfall trap, 01.VII.2022, 3 individuals, pan traps. Collector name: Samih

& Maatouf; Worldwide distribution: Morocco (Nikodym & Bezdek, 2006; Habbaz *et al.*, 2025); Ecological insight: Characterized by its close interactions with flowering plants, it feeds on pollen and nectar, thus playing a role in pollination (Samih *et al.*, 2024).

Family: Histeridae Gyllenhal, 1808

Hypocaccus rugiceps (Duftschmid, 1805)

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 12.V.2022, 2 individuals, pan traps, 21.VII.2022, 2 individuals, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: Europe and China (Mazur, 2004; Habbaz *et al.*, 2025).

Saprinus proximus simillimus (Wollaston, 1865)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 01.VI.2022, 8 individuals, pitfall trap, 01.VI.2022, 1 individual, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: North Africa (Mazur, 2004) and Morocco (Habbaz *et al.*, 2025).

Family: Hydraenidae Mulsant, 1844

Ochthebius bicolon (Germar, 1823) [N]

Material examined

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W,28.X.2021, 1 individual, pan traps; Collector name: Samih; Worldwide distribution: Europe (Jäch, 2004).

Family: Hydrophilidae Latreille, 1802

Cercyon obsolandus (Gyllenhal, 1808) [N]

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 12.V.2022, 1 individual, pan traps; Collector name: Samih; Worldwide distribution: Europe, Algeria and Canary Islands (Hansen, 2004).

Sphaeridium scarabaeoides (Linnaeus, 1758) [N]

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 01.VI.2021, 1 individual, pan traps. 21.VII.2022, 1 individual, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: Europe, Asia and Tunisia (Hansen, 2004).

Family: Laemophloeidae Ganglbauer, 1899

Laemophloeus monilis (Fabricius, 1787) [S]

Material examined

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 27.V.2021, 1 individual, pan traps; Collector name: Maatouf; Worldwide distribution: Europe, Uzbekistan, Tunisia, Algeria (Wegrzynowiez, 2007b) and Morocco (Benyahia, 2016; Habbaz *et al.*, 2025).

Laemophloeus muticus (Fabricius, 1781) [N]

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 15.IX.2021, 1 individual, pan traps; Collector name: Maatouf; Worldwide distribution: Europe and Russie (Wegrzynowiez, 2007b).

Family: Latridiidae Erichson, 1842

Corticarina curta (Wollaston, 1854)

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 22.VI.2022, 1 individual, pan traps; Collector name: Maatouf; Worldwide distribution: Europe, Asia and North Africa (Johnson, 2007; Habbaz *et al.*, 2025).

Enicmus transversus (Olivier, 1790)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 27.V.2021, 1 individual, pan traps; Collector name: Samih; Worldwide distribution: Europe, Afghanistan, China, Israel, Jordan, Syria and North Africa (Johnson, 2007).

Stephostethus productus (Rosenhauer, 1856)

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 15.IX.2021, 1 individual, pitfall trap, 15.IX.2021, 1 individual, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: France, Italy, Portugal, Spain and North Africa (Johnson, 2007).

Family: Meloidae Gyllenhaal, 1810

Berberomeloe majalis (Linnaeus, 1758) (Fig. 5A)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 04.VIII.2021, 1 individual, direct surveys; Collector name: Samih; Worldwide distribution: France, Portugal, Spain, Algeria, Tunisia and Morocco (Bologna, 2008).

Croscherichia paykulli (Billberg, 1813)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 15.IX.2021, 1 individual, pitfall trap; Collector name: Maatouf; Worldwide distribution: Algeria, Tunisia, Libya and Morocco (Bologna, 2008).

Hycleus rufipalpis (Escalera, 1909)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 01.VII.2021, 3 individuals, pitfall trap, 04.VIII.2021, 1 individual, pitfall trap, 15.IX.2021, 1 individual, pitfall trap, 28.X.2021, 2 individuals, pan traps, 22.VI.2022, 1 individual, pan traps, 21.VII.2022, 1 individual, pitfall trap, 21.VII.2022, 2 individuals, pan traps, 27.IX.2022, 9 individuals, pan traps; Collector name: Samih, Maatouf & Habbaz; Worldwide distribution: Canary Islands and Morocco (Bologna, 2008; Habbaz *et al.*, 2025).

Mylabris variabilis (Pallas, 1781) (Fig. 5D)

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 22.VI.2022, 1 individual, pan traps; Collector name: Samih; Worldwide distribution: Europe, Asia (Bologna, 2008) and Morocco (Pan *et al.*, 2014).

Family: Melolonthidae Leach, 1819

Euserica mamorensis (Baraud, 1965) [E]

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 20.IV.2021, 1 individual, pan traps, 01.VII.2021, 1 individual, pan traps, 01.VI.2022, 3 individuals, pan traps, 22.VI.2022, 3 individuals, pan traps.

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 29.IV.2021, 1 individual, pan traps, 01.VII.2021, 2 individuals, pan traps.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 29.IV.2021, 1 individual, pan traps, 01.VII.2021, 2 individuals, pan traps, 04.VIII.2021, 1 individual, pan traps, 04.VIII.2021, 1 individual, pitfall trap. 12.V.2022, 1 individual, malaise trap , 22.VI.2022, 1 individual, pan traps; Collector name: Samih, Maatouf &Habbaz; Worldwide distribution: Morocco (Bezdek, 2006; Habbaz *et al.*, 2025).

Hoplia africana (Escalera, 1914)

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 29.IV.2021, 7 individuals, pan traps, 27.V.2021, 12 individuals, pan traps, 12.V.2022, 4 individuals, pan traps, 22.VI.2022, 7 individuals, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: Algeria, Morocco and Tunisia (Smetana, 2006).

Hoplia bilineata (Fabricius, 1801)

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 27.V.2021, 5 individuals, pan traps; Collector name**:** Maatouf; Worldwide distribution: Spain, Algeria, Morocco and Tunisia (Smetana, 2006).

Hoplia philanthus (Fuessly, 1775)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 12.V.2022, 1 individual, pan traps.

Forest edge, 27.V.2021, 3 individuals, pan traps, 01.VII.2021, 5 individuals, pan traps, 12.V.2022, 3 individuals, pan traps, 21.VII.2022, 3 individuals, pan traps; Collector name: Samih, Maatouf & Habbaz; Worldwide distribution: Spain and Morocco (Smetana, 2006).

Sphodroxia Moroccana (Ley, 1923) [E]

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 15.IX.2021, 1 individual, pitfall trap, 27.IX.2022, 3 individuals, pitfall trap.

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 04.VIII.2021, 1 individual, pitfall trap; Collector name: Samih & Maatouf; Worldwide distribution: Morocco (Bezdek, 2006; Habbaz *et al.*, 2025).

Family: Melyridae Leach, 1815

Aplocnemus virens (Suffrian, 1843) [N]

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 27.V.2021, 1 individual, pan traps.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 04.VIII.2021, 2 individuals, pan traps, 22.VI.2022, 2 individuals, pan traps, 21.VII.2022, 2 individuals, pan traps. Collector name: Samih & Maatouf; Worldwide distribution: Europe (Mayor, 2007b).

Colotes javeti (Jacquelin du Val, 1852)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 01.VI.2022, 1 individual, pan traps; Collector name: Samih; Worldwide distribution: Spain, France, Italy, Portugal, Egypt, Tunisia, Algeria and Morocco (Mayor, 2007; Habbaz *et al.*, 2025).

Psilothrix viridicoerulea (Geoffroy, 1758)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 29.IV.2021, 1 individual, pan traps.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 29.IV.2021, 2 individuals, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: Europe, North Africa and Turkey (Mayor, 2007; Amokrane *et al.*, 2020).

Troglops furcatus (Perrin, 1885)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 29.IV.2021, 1 individual, pan traps, 01.VI.2022, 5 individuals, pan traps.

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 29.IV.2021, 4 individuals pan traps; Collector name: Samih, Maatouf & Habbaz; Worldwide distribution: Portugal, Spain, Algeria and Morocco (Mayor, 2007b)

Family: Mordellidae Latreille, 1802

Mediimorda bipunctata (Germar, 1827)

Material examined

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 04.VIII.2021, 1 individual, pitfall trap.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 01.VII.2021, 5 individuals, pan traps, 04.VIII.2021, 19 individuals, pan traps, 15.IX.2021, 17 individuals, pitfall trap, 21.VII.2022, 1 individual, pan traps, 27.IX.2022, 2 individuals, pan traps; Collector name: Samih, Maatouf & Habbaz; Worldwide distribution Europe, Asia, North Africa (Horak, 2008) and Morocco (Habbaz *et al.*, 2025).

Mordella aculeata (Linnaeus, 1758)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 27.V.2021, 1 individual, pan traps, 01.VII.2021, 1 individual, pan traps, 01.VI.2022, 1 individual, pan traps.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 01.VI.2022, 3 individuals, pan traps, 21.VII.2022, 2 individual, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: Europe, Asia (Horak, 2008), Austria, Belgium, Bosnia, Herzegovina, Bulgaria, Croatia, Czech Republic, Denmark, France, Germany, Greece, Hungary, Italy, Albania, Macedonia, Poland, Portugal, Romania, Serbia, Montenegro, Slovakia, Slovenia, Spain, Sweden, Switzerland, Syria, Turkey, Georgia, Ukraine, Belarus, Russia, Kazakhstan, China, Taiwan, Japan, South Korea (Ruzzier *et al.*, 2017) and Morocco (Habbaz *et al.*, 2025).

Variimorda villosa (Schrank von Paula, 1781) [N]

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 21.VII.2022, 1 individual, pitfall trap.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 01.VII.2021, 6 individuals, pan traps, 04.VIII.2021, 40 individuals, pan traps, 19.IX.2021, 9 individuals, pan traps, 28.X.2021, 6 individuals, pan traps, 22.VI.2022, 2 individuals, pan traps, 21.VII.2022, 60 individuals, pan traps, 27.IX.2022, 9 individuals, pan traps; Collector name: Samih, Maatouf & Habbaz; Worldwide distribution: Europe and Asia (Horak, 2008).

Family: Nitidulidae Latreille, 1802

Carpophilus hemipterus (Linnaeus, 1758)

Material examined

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 27.V.2021, 1 individual, pan traps.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W,28.X.2021, 1 individual, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: Europe, Asia, Algeria, Canary Islands, Egypt, Libya, Madeira Island, Tunisia (Jelinek & Audisio, 2007) and Morocco (Chavanon, 2018; Habbaz *et al.*, 2025).

Epuraea latipes (Grouvelle, 1896)

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 01.VII.2021, 2 individuals, pan traps; Collector name: Maatouf; Worldwide distribution: Algeria, Morocco and Turkey (Jelinek & Audisio, 2007).

Meligethes aeneus (Fabricius, 1775)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 29.IV.2021, 5 individuals, pan traps, 27.V.2021, 1 individual, pan traps, 12.V.2022, 1 individual, pan traps, 21.VII.2022, 2 individuals, pan traps. Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 29.IV.2021, 2 individuals, pan traps.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 29.IV.2021, 3 individuals, pan traps, 01.VII.2021, 2 individuals, pan traps, 04.VIII.2021, 3 individuals, pitfall trap, 01.VI.2022, 2 individuals, pan traps; Collector name: Samih, Maatouf & Habbaz; Worldwide distribution: Europe, Asia and North Africa (Jelinek & Audisio, 2007).

Meligethes viridescens (Fabricius, 1787)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 28.X.2021, 1 individual, pan traps, 12.V.2022, 2 individuals, pan traps.

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 29.IV.2021, 1 individual, pan traps.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 29.IV.2021, 2 individuals, pan traps, 01.VI.2022, 2 individuals, pan traps; Collector name: Samih, Maatouf & Habbaz; Worldwide distribution: Europe, Asia, Algeria, Morocco and Tunisia (Jelinek & Audisio, 2007).

Family: Oedemeridae Latreille, 1810

Chrysanthia viridissima (Linnaeus, 1758) [N]

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 29.IV.2021, 22 individuals, pan traps, 27.V.2021, 98 individuals, pan traps, 01.VII.2021. 2 individuals, pan traps, 12.V.2022, 2 individuals, pan traps, 01.VI.2022, 7 individuals, pan traps, 22.VI.2022, 1 individual, pan traps; Collector name: Samih, Maatouf & Habbaz; Worldwide distribution: Europe and Russia (Švihla, 2008).

Oedemera barbara (Fabricius, 1792) (Fig. 4H) [S]

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 27.V.2021, 8 individuals, pan traps, 01.VII.2021, 3 individuals, pan traps, 29.IV.2022, 2 individuals, pan traps, 01.VI.2022, 10 individuals, pan traps, 22.VI.2022, 3 individuals, pan traps.

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 27.V.2021, 1 individual, pan traps.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 04.VIII.2021, 19 individuals, pan traps, 27.V.2022, 4 individuals, pan traps, 01.VI.2022, 2 individuals, pitfall trap, 22.VI.2022, 5 individuals, pan traps, 01.VII.2022, 22 individuals, pan traps, 21.VII.2022, 1 individual, pan traps; Collector name: Samih, Maatouf & Habbaz; Worldwide distribution: Europe, North Africa, Turkey (Švihla, 2008) and Morocco (Habbaz *et al.*, 2025); Ecological insight Is considered a pollinator, with adult beetles visiting flowers to feed on pollen and nectar (Samih *et al.*, 2024).

Oedemera marmorata (Erichson, 1841)

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 27.V.2022, 5 individuals, pan traps, 01.VI.2022, 29 individuals, pan traps, 22.VI.2022, 4 individuals, pan traps, 01.VII.2022, 5 individuals, pan traps; Collector name: Samih, Maatouf & Habbaz; Worldwide distribution: Portugal, Spain, Algeria, Morocco and Tunisia (Švihla, 2008).

Family: Phalacridae Leach, 1815

Olibrus pygmaeus (Sturm, 1807)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 04.VIII.2021, 1 individual, pan traps, 01.VI.2022, 1 individual, pan traps.

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 04.VIII.2021, 1 individual, pan traps.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 29.IV.2021, 3 individuals, pan traps, 15.IX.2021, 2 individuals, pan traps, 22.VI.2022, 1 individuals, pan traps, 21.VII.2022, 4 individuals, pan traps; Collector name: Samih, Maatouf & Habbaz; Worldwide distribution: Europe, North Africa, Syria and Turkey (Švec, 2008).

Phalacrus coruscus (Panzer, 1797)

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 29.IX.2022, 2 individuals, pan traps; Collector name: Samih; Worldwide distribution: Europe, North Africa and Asia (Švec, 2008).

Family: Ptinidae Latreille, 1802

Dignomus irroratus (Kiesenwandter, 1851) [N]

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 29.IV.2021, 1 individual, pan traps.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 01.VII.2021, 1 individual, pan traps, 01.VI.2022, 1 individual, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: Europe (Borowski, 2007).

Stegobium paniceum (Linnaeus, 1758) [S]

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 04.VIII.2021, 1 individual, pan traps, 28.X.2021, 1 individual, pan traps, 01.VI.2022, 1 individual, pan traps, 22.VI.2022, 1 individual, pan traps.

Rissana, Forest edge 35°12'43.1 N 6°01'57.8 W, 04.VIII.2021, 4 individuals, pan traps, 15.IX.2021, 4 individuals, pan traps, 22.VI.2022, 4 individuals, pan traps, 01.VII.2022, 1 individual, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: Europe, Asia, North Africa (Borowski, 2007; Habbaz *et al.*, 2025).

Family: Scarabaeidae Latreille, 1802

Anisoplia baetica (Erichson, 1847) [N]

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 12.V.2022, 2 individuals, pan traps, 01.VI.2022, 2 individuals, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: Portugal and Spain (Smetana, 2006).

Anthoplia floricola (Fabricius 1787)

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 22.VI.2022, 1 individual, pan traps; Collector name: Samih; Worldwide distribution: Portugal, Spain, Algeria, Morocco, Tunisia and Libya (Smetana, 2006).

Aphodius diecki (Harold, 1870)

Material examined

Forest edge, 35°12'43.1 N 6°01'57.8 W, 22.VI.2022, 28.X.2021, 1 individual, pitfall trap; Collector name: Samih; Worldwide distribution: Europe, Asia, Algeria, Tunisia and Morocco (Dellacasa & Dellacasa, 2006).

Blitopertha lineata (Fabricius, 1798)

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 22.VI.2022, 1 individual, pan traps; Collector name: Samih; Worldwide distribution: Spain, Algeria, Morocco and Tunisia (Smetana, 2006).

Gymnopleurus flagellatus (Fabricius, 1787)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 01.VII.2021, 1 individual, pitfall trap; Collector name: Samih; Worldwide distribution: Europe, Asia and North Africa (Löbl *et al.*, 2006).

Gymnopleurus sturmii (MacLeay, 1821) [Rc]

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 01.VII.2021, 1 individual, pitfall trap; Collector name: Samih; Worldwide distribution: Europe, Jordan, Israel, Syria, Turkey and North Africa (Löbl *et al.*, 2006).

Onthophagus maki (Illiger, 1803) (Fig. 5F) [Rc]

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 12.V.2022, 4 individuals, pitfall trap, 01.VI.2022, 4 individuals, pitfall trap, 22.VI.2022, 2 individuals, pitfall trap; Collector name: Samih & Maatouf; Worldwide

distribution Spain, France, Portugal, Italy, North Africa (Löbl *et al.*, 2006a) and Morocco (Habbaz *et al.*, 2025); Ecological insight: as a dung beetle, *Onthophagus* contributes to nutrient cycling by breaking down dung into smaller pieces, enhancing nutrient availability for plants. The process of dung burial helps incorporate organic matter into the soil (Ramli *et al.*, 2019).

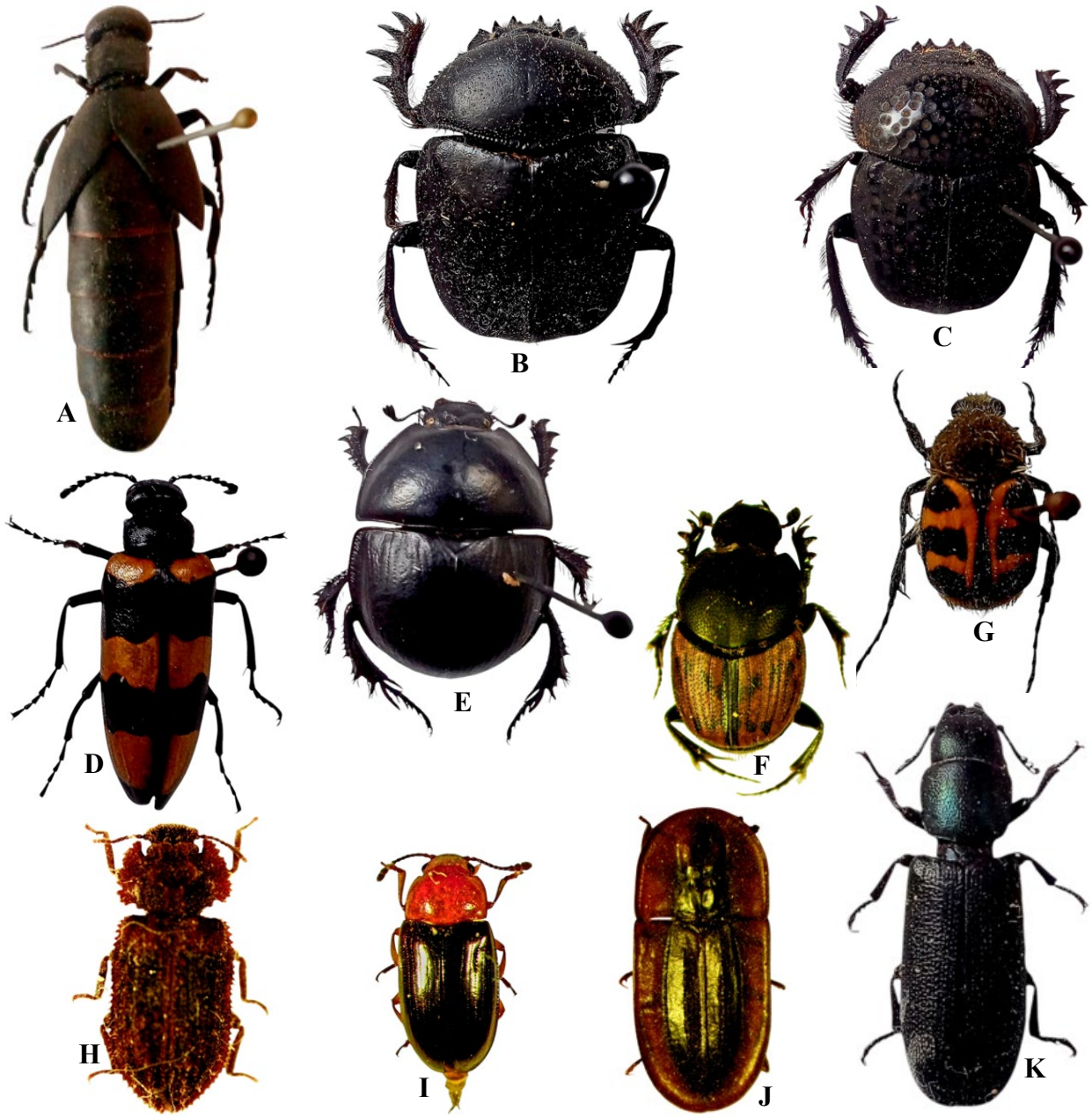

Fig. 5. The beetles associated with the Larache cork oak forest. A. *Berberomeloe majalis* (Linnaeus, 1758), B. *Scarabaeus sacer* (Linnaeus, 1758), C. *Scarabaeus cicatricosus* (P.H.Lucas, 1846), D. *Mylabris variabilis* (Pallas, 1781), E. *Thorectes distinctus* (Marseul, 1878), F. *Onthophagus maki* (Illiger, 1803), G. *Trichius zonatus* (Germar, 1831), H. *Endophloeus markovichianus* (Piller & Mitterpacher, 1783), I. *Triplax lacordairei* (Crotch, 1870), J. *Cossyphus hoffmanseggi* (Herbst, 1797), K. *Temnoscheila caerulea* (Olivier, 1790) (photos by A. Samih and N. Maatouf).

Onthophagus maki (Illiger, 1803) (Fig. 5F) [Rc]

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 12.V.2022, 4 individuals, pitfall trap, 01.VI.2022, 4 individuals, pitfall trap, 22.VI.2022, 2 individuals, pitfall trap; Collector name: Samih & Maatouf; Worldwide distribution Spain, France, Portugal, Italy, North Africa (Löbl *et al.*, 2006a) and Morocco (Habbaz *et al.*, 2025); Ecological insight: as a dung beetle, *Onthophagus* contributes to nutrient cycling by breaking down dung into smaller pieces, enhancing nutrient availability for plants. The process of dung burial helps incorporate organic matter into the soil (Ramli *et al.*, 2019).

Oxythyrea funesta (Poda, 1761) [S]

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 12.V.2022, 1 individual, pan traps, 01.VI.2022, 1 individual, pitfall trap, 01.VI.2022, 1 individuals, pan traps.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 01.VI.2022, 2 individuals, pan traps, 22.VI.2022, 2 individuals, pan traps, 21.VII.2022, 26 individuals, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: Europe, Asia, North Africa (Smetana, 2006) and Morocco (Habbaz *et al.*, 2025).

Pleurophorus caesus (Creutzer, 1796)

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 12.V.2022, 3 individuals, pan traps, 12.V.2022, 2 individuals, pitfall trap, 01.VI2022, 2 individuals, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: Europe, Asia and North Africa (Dellacasa & Dellacasa, 2006).

Protaetia opaca (Fabricius, 1787) [R]

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 01.VI.2022, 1 individual, pan traps.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 01.VII.2021, 1 individual, pan traps, 01.VI.2022, 5 individuals, pan traps, 22.VI.2022, 2 individuals, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: France, Italy, Portugal, Spain, Canary Islands, Algeria, Tunisia and Morocco (Smetana, 2006).

Scarabaeus cicatricosus (P.H.Lucas, 1846) (Fig. 5C) [Rc]

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 01.VII.2021, 21 individuals, pitfall trap, 04.VIII.2021, 4 individuals, pitfall trap, 15.IX.2021, 14 individuals, pitfall trap, 28.X.2021, 12 individuals, pitfall trap, 12.V.2022, 3 individuals, pitfall trap, 01.VI.2022, 4 individuals, pitfall trap, 22.VI.2022, 27 individuals, pitfall trap, 21.VII.2022, 5 individuals, pitfall trap, 30.XII.2022, 1 individual, pitfall trap.

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 04.VIII.2021, 1 individual, pitfall trap, 28.X.2021, 2 individuals, pitfall trap, 30.XII.2021, 3 individuals, pitfall trap.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 12.V.2022, 1 individual, pitfall trap; Collector name: Samih, Maatouf & Habbaz; Worldwide distribution: Spain, Portugal, Algeria and Morocco (Löbl *et al.*, 2006b; Habbaz *et al.*, 2024); Ecological insight*: Scarabaeus* as a coprophagous species, it feeds primarily on the dung of herbivores, which it collects, buries and consumes (Barbero *et al.*, 1999; Bai *et al.*, 2015). This behavior not only helps to break down and decompose animal waste but also contributes to the redistribution of nutrients back into the soil, promoting soil fertility (Thotagamuwa *et al.*, 2023).

Scarabaeus sacer (Linnaeus, 1758) (Fig. 5B)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 01.VII.2021, 2 individuals, pitfall trap, 15.IX.2021, 1 individual, pitfall trap, 01.VI.2022, 7 individuals, pitfall trap, 21.VII.2022, 1 individual pitfall trap; Collector name: Samih & Maatouf; Worldwide distribution: Europe, Asia, North Africa (Löbl *et al.*, 2006) and Morocco (Habbaz *et al.*, 2025).

Trichius zonatus (Germar, 1831) (Fig. 5G) [R]

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 01.VI.2022, 2 individuals, pan traps; Collector name: Samih; Worldwide distribution: Algeria, Tunisia and Morocco (Smetana, 2006).

Tropinota squalida pilosa (Brullé, 1832)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 27.V.2021, 1 individual, pan traps.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 01.VI.2022, 1 individual, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: Asia, North Africa (Smetana, 2006) and Morocco (Habbaz *et al.*, 2025).

Family: Scolytidae Latreille, 1804

Hypoborus ficus (Erichson, 1836)

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 04.VIII.2021, 2 individuals, pan traps; Collector name: Maatouf; Worldwide distribution: Europe, Asia, North Africa (Knizek, 2011) and Morocco (Habbaz *et al.*, 2025).

Platypus cylindrus (Fabricius, 1792)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 30.XII.2022, 1 individual, pan traps.

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 27.V.2021, 2 individuals, pan traps, 01.VII.2021, 1 individual, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: Europe, Asia, North Africa (Knizek, 2011) and Morocco (Habbaz *et al.*, 2025).

Xyleborus monographus (Fabricius, 1792) [S]

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 04.VIII.2021, 1 individual, pan traps.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 15.IX.2021, 4 individuals, pan traps, 28.X.2021, 2 individuals, pan traps, 27.IX.2022, 1 individual, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: Europe, Asia, Algeria and Morocco (Knizek, 2011; Habbaz *et al.*, 2025).

Family: Scraptiidae Mulsant, 1856

Scraptia fuscula (Müller, 1821)

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 15.IX.2021, 3 individuals, pan traps, 01.VI.2022, 2 individuals, pan traps, 22.VI.2022, 2 individuals, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: Europe, Algeria and Morocco (Leblanc *et al.*, 2008).

Family: Staphylinidae Latreille, 1802

Oxytelus sculptus (Gravenhorst, 1806) [S]

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 12.V.2022, 2 individuals, pan traps.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 12.V.2022, 1 individual, pan traps, 27.IX.2022, 1 individual, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: Europe, Asia and Morocco (Smetana, 2004).

Philonthus longicornis (Stephens, 1832) [N]

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 12.V.2022, 6 individuals, pan traps, 01.VI.2022, 6 individuals, pan traps, 22.VI.2022, 7 individuals, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: Europe, Asia and North Africa (Smetana, 2004).

Spedophilus marshami (Stephens, 1832) [N]

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 01.VI.2022, 1 individual, pan traps; Collector name: Samih; Worldwide distribution: Europe, Tunisia, South Korea, Russia and Turkey (Smetana, 2004).

Tachyporus hyponorum (Fabricius, 1775)

Material examined

Zouada, Open forest, 35°10'48.0 N 5°58'40.1 W, 27.V.2021, 1 individual.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 12.V.2022, 2 individuals, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: Europe, Asia, Algeria, Tunisia and Morocco (Smetana, 2004).

Tachyporus nitidulus (Fabricius, 1781) [N]

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 27.V.2021, 2 individuals, pan traps, 12.V.2022, 6 individuals, pan traps, 01.VI.2022, 3 individuals, pan traps; Collector name: Samih; Worldwide distribution: Europe, Asia and North Africa except Morocco (Smetana, 2004).

Xantholinus linearis (Olivier, 1795)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 12.V.2022, 1 individual, pan traps.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 04.VIII.2021, 11 individuals, pan traps, 12.V.2022, 6 individuals, pan traps, 01.VI.2022, 17 individuals, pan traps, 21.VII.2022, 13 individuals, pan traps; Collector name: Samih, Maatouf & Habbaz; Worldwide distribution: Europe, Asia, North Africa (Smetana, 2004) and Morocco (Habbaz *et al.*, 2025).

Family: Tenebrionidae Latreille, 1802

Adelostoma sulcatum (Duponchel, 1829)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 27.IX.202, 1 individual, pitfall trap.

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 01.VII.2021, 1 individual, pitfall trap; Collector name: Samih & Maatouf; Worldwide distribution: Spain, Greece, Asia, North Africa (Löbl *et al.*, 2008) and (Habbaz *et al.*, 2025).

Boromorphus tagenoides (Lucas, 1846)

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 15.IX.2021, 1 individual, pitfall trap; Collector name: Maatouf; Worldwide distribution: Spain and North Africa (Löbl *et al.*, 2008).

Cnemeplatia atropos (Costa, 1847)

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 15.IX.2021, 1 individual, pitfall trap, 22.VI.2022, 1 individual, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: Europe, Asia, Tunisia, Egypt and Morocco (Löbl *et al.*, 2008).

Cossyphus hoffmanseggi (Herbst, 1797) (Fig. 5J)

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 04.VIII.2021, 3 individuals, pitfall trap, 15.IX.2021, 1 individual, pitfall trap, 12.V.2022, 1 individual, pitfall trap, 22.VI.2022, 1 individual, pitfall trap, 01.VII.2022, 3 individuals, pitfall trap; Collector name: Samih & Maatouf; Worldwide distribution Spain, Portugal, Algeria and Morocco (Löbl *et al.*, 2008).

Gonocephalum granulatum granulatum (Fabricius, 1792) [E]

Material examined

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 15.IX.2021, 1 individual, pitfall trap; Collector name**:** Samih; Worldwide distribution**:** Morocco (Iwan & Löbl, 2008).

Heliotaurus ruficollis tangerianus (Escalera, 1922) [E]

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 01.VI.2022, 10 individuals, pan traps.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 27.V.2021, 1 individual, pan traps, 12.V.2022, 2 individuals, pan traps, 12.V.2022, 7 individuals, malaise trap, 01.VI.2022, 448 individuals, pan traps, 22.VI.2022, 7 individuals, pan traps, 01.VII.2022, 6 individuals, pan traps; Collector name**:** Samih & Maatouf; Worldwide distribution: Morocco (Novak & Pandtersson, 2008; Habbaz *et al.*, 2025).

Isomira melanophthalma (Lucas, 1846)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 01.VI.2022, 1 individual, pan traps.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 12.V.2022, 1 individual, imalaise trap; Collector name: Samih & Maatouf; Worldwide distribution: Portugal, France, Italy, Croatia, Bosnia, Algeria, and Morocco (Novak & Pandtersson, 2008; Habbaz *et al.*, 2025).

Latheticus oryzae (Waterhouse, 1880)

Material examined

Forest edge, 35°12'43.1 N 6°01'57.8 W, 27.V.2021, 1 individual, pan traps; Collector name: Maatouf; Worldwide distribution: Europe, Asia, North Africa (Löbl *et al.*, 2008) and Morocco (Habbaz *et al.*, 2025).

Pimelia chrysomeloides subris (Koch, 1941) [E] [S]

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 15.IX.2021, 13 individuals, pitfall trap, 28.X.2021, 10 individuals, pitfall trap, 12.V.2022, 15 individuals, pitfall trap, 01.VI.2022, 23 individuals, pitfall trap, 22.VI.2022, 8 individuals, pitfall trap, 21.VII.2022, 11 individuals, pitfall trap, 27.IX.2022, 11 individuals, pitfall trap, 30.XII.2022, 9 individuals, pitfall trap.

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 01.VII.2021, 2 individuals, pitfall trap, 15.IX.2021, 4 individuals, pitfall trap, 28.10.2021, 3 individuals, pitfall trap, 30.XII.2021, 4 individuals, pitfall trap; Collector name: Samih, Maatouf & Habbaz; Worldwide distribution: Morocco (Löbl *et al.*, 2008; Habbaz *et al.*, 2025); Ecological insight: Genus *Pimelia* is decomposer (saprophagous), primarily feeding on decaying plant material, seeds and occasionally fungi (De Vega, 2011; Karmaoui *et al.*, 2023).

Sepidium bidentatum (Solier, 1843)

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 01.VI.2022, 01.VII.2021, 4 individuals, pitfall trap, 12.V.2022, 6 individuals, pitfall trap, 01.VI.2022, 27 individuals, pitfall trap, 22.VI.2022, 4 individuals, pitfall trap.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 12.V.2022, 4 individuals, pitfall trap, 22.VI.2022, 1 individual, pitfall trap; Collector name: Samih & Maatouf; Worldwide distribution: Spain, Portugal and Morocco (Löbl *et al.*, 2008).

Zophosis minuta (Fabricius, 1775) [S]

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 01.VII.2021, 12 individuals, pitfall trap, 04.VIII.2021, 1 individual, pitfall trap, 15.IX.2021, 7 individuals, pitfall trap, 28.X.2021, 4 individuals, pitfall trap, 12.V.2022,

24 individuals, pitfall trap, 01.VI.2022, 9 individuals, pitfall trap, 22.VI.2022, 7 individuals, pitfall trap, 21.VII.2022, 3 individuals, pitfall trap, 27.IX.2022, 2 individuals, pitfall trap.

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 01.VII.2021, 1 individual, pitfall trap, 04.VIII.2021, 4 individuals, pitfall trap, 28.X.2021, 1 individual, pitfall trap; Collector name: Samih, Maatouf & Habbaz; Worldwide distribution: Tunisia (Lefèvre, 1885), Portugal, Spain, Morocco (Löbl *et al.*, 2008; Habbaz *et al.*, 2025).

Family: Trogossitidae Latreille, 1802

Temnoscheila caerulea (Olivier, 1790) (Fig. 5K) [N] [R]

Material examined

Larache, Dense forest, 35°11'40.9 N 06°07'34.9 W, 15.IX.2021, 1 individual, pan traps.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 15.IX.2021, 1 individual, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: Europe, Canary Islands, Tunisia and China (Kolibac, 2007); Ecological insight: An important predator of bark beetles (Cebeci & Baydemir, 2018). It helps regulate their populations, reducing the risk of infestations and preventing potential damage to trees and forest ecosystems (Etxebeste *et al.*, 2013).

Family: Zopheridae Solier, 1834

Endophloeus markovichianus (Piller & Mitterpacher, 1783) (Fig. 5H) [R]

Material examined

Zouada, Open forest, 35°03'20.2 N 6°01'48.0 W, 15.IX.2021, 1 individual, pan traps.

Rissana, Forest edge, 35°12'43.1 N 6°01'57.8 W, 15.IX.2021, 1 individual, pan traps; Collector name: Samih & Maatouf; Worldwide distribution: Europe, Algeria, Tunisia and Morocco (Šlipinski & Schuh, 2008).

Discussion

Beetle diversity and taxonomic insights

The results aim to address the gap in scientific knowledge regarding beetle communities in Moroccan forest ecosystems, particularly within the cork oak forest of Larache, located on the Atlantic coastal plain. A total of 180 have been identified at the species level, belonging to 37 families, and have been inventoried. It can be deduced that there is significant taxonomic diversity among beetles, compared to increasingly anthropized environments. In the northeastern cork oak forests of Algeria, beetles are represented by 74 species (Ganaoui *et al.*, 2020). In contrast, 216 species belonging to 42 families have been recorded in the cork oak forest of Maâmora (Habbaz *et al.*, 2025). This difference could be partly explained by the greater fragmentation of our study area compared to Maâmora, which may influence the diversity and distribution of species. Additionally, it is important to note that the use of Malaise traps in our study, while effective for certain groups, may not capture as many beetle species as interception traps. The latter were used in the study of Maâmora (Habbaz *et al.*, 2025) and are particularly effective for capturing beetle species, especially saproxylic groups, which are associated with decaying wood and contribute significantly to overall diversity.

Ecological significance of saproxylic and red list species

In our study, we inventoried only 13 saproxylic species, which confirms, on one hand, that the Larache cork oak forest is an ecosystem undergoing changes with unprotected habitats, and on the other hand, it is possible our study sites did not have enough dead wood or old trees to support robust saproxylic insect populations. However, the limited occurrence of saproxylic species may be attributed to the sampling methods employed, as these species are commonly collected using flight interception traps (Bouget *et al.*, 2008; Burner *et al.*, 2022b), techniques not employed in this study. Ten species of beetles are now listed in the Mediterranean Red List, highlighting their status as rare and threatened species. Within this group, 7 saproxylic species are notable for being listed in the Red List of Saproxylic Beetles of the Mediterranean region, while 3 are listed as coprophagous in the Red List of coprophagous species in the Mediterranean region. Saproxylic species, which depend on dead or decaying wood at some stage of their life cycle, play a vital ecological role in forest ecosystems (Seibold & Thorn, 2018; Zumr *et al.*, 2024).

Table 2. List of species collected in the Cork Oak forest of Larache at sites Dense forest (S1), Open Forest (S2) and Forest edge (S3), and their status: [S] Saproxylic species, [R] Saproxylic species and [Rc] coprophagous species; listed in the Red List of the Mediterranean region, [N] Species newly recorded for Morocco and [E] Endemic species.

Families	Species	Status	Dense forest	Forest edge	Open Forest
Anthicidae	*Hirticollis quadriguttatus* (Rossi, 1792)			*	
	Omonadus bifasciatus (Rossi, 1792)			*	
	Omonadus floralis (Linnaeus, 1758)			*	
Brentidae	*Apion frumentarium* (Walton, 1844)	N	*	*	
	Hemitrichapion reflexum (Gyllenhal, 1833)	N	*	*	
Bruchidae	*Bruchidius biguttatus* (Olivier, 1795)		*		
	Bruchidius bimaculatus (Olivier, 1795)			*	
	Bruchidius foveolatus (Gyllenhal, 1833)		*	*	
Buprestidae	*Acmaeodera adsperula* (Illiger, 1803)	S	*	*	
	Acmaeodera discoida (Fabricius, 1787)			*	
	Acmaeodera lanuginosa (Gyllenhall, 1817)		*	*	
	Agrilus biguttatus (Fabricius, 1777)	S		*	
	Agrilus graminis mamorensis (Théry, 1930)	E, S			*
	Anthaxia millefolii polychloros (Abeille de Perrin, 1894)		*	*	
	Anthaxia scutellaris atlasica (Théry, 1930)				*
	Anthaxia umbellatarum umbellatarum (Fabricius, 1787)		*	*	
	Habroloma triangulare (Lacordaire, 1835)		*		
Carabidae	*Acupalpus brunnipes* (Sturm, 1825)			*	
	Agonum emarginatum (Gyllenhal, 1827)	N		*	
	Bembidion biguttatum (Fabricius, 1779)	N		*	
	Bembidion bipunctatum laevifrons (Schaufuss, 1882)			*	
	Bradycellus verbasci (Duftschmid, 1812)			*	
	Carterus rotundicollis (Rambur, 1837)			*	
Carabidae	*Cincidela Moroccana* (Fabricius, 1801)		*		
	Cymindis lineola (L. Dufour, 1820)	N	*		
	Cymindis platicollis (Say, 1823)	N			*
	Harpalus attenuatus (Stephens, 1828)			*	
	Microlestes abeillei brisouti (Holdhaus, 1912)			*	
	Ophonus ardosiacus (Lutshnik, 1922)		*		
	Ophonus subquadratus (Dejean, 1829)	N		*	
	Paradromius linearis (Olivier, 1795)			*	
	Philorhizus notatus (Stephens, 1827)	N	*		
	Pterostichus elongatus (Duftschmid, 1812)		*	*	*
	Scarites terricola terricola (Bonelli, 1813)		*		
	Singilis soror soror (Rambur, 1837)		*		
	Stenolophus abdominalis abdominalis (Gene, 1836)		*		
	Stenolophus teutonus (Schrank, 1781)			*	
	Syntomus foveatus (Geoffroy, 1785)			*	
Cerambycidae	*Agapanthia irrorata* (Fabricius, 1787)			*	
	Alocerus moesiacus (Frivaldszky, 1837)				*
	Certallum ebulinum (Linné, 1767)			*	
	Chlorophorus favieri (Farimaire, 1873)	E, R		*	
	Phytoecia coerulescens (Scopoli, 1763)			*	
	Oxypleurus nodieri (Mulsant, 1839)			*	
	Stenurella approximans (Rosenhauer, 1856)		*	*	
	Stictoleptura fontenayi (Mulsant and Rey, 1839)		*		
	Trichoferus ilicis (Sama, 1987)	E, R	*	*	
Chrysomelidae	*Aphthona euphorbiae* (Schrank, 1781)			*	

Table 2. Countinued					
	Cassida vittata (Villers, 1789)			*	
	Chrysolina bankii (Fabricius, 1775)		*		
	Chrysolina diluta (Germar, 1823)	N			*
	Cryptocephalus fulvus (Goeze, 1777)	N	*		*
	Cryptocephalus numidicus (Bourdonné, 1876)			*	
	Longitarsus aeneus (Kutschera, 1862)		*	*	*
	Longitarsus ochroleucus (Marsham, 1802)		*		*
	Oulema melanopus (Linnaeus, 1758)				*
	Psylliodes cuprea (Koch, 1803)			*	
Coccinelidae	*Adalia decempunctata* (Linnaeus, 1758)				*
	Chilocorus bipustulatus (Linnaeus, 1758)				*
	Coccinella septempunctata (Linnaeus, 1758)				*
	Oenopia conglobata (Linnaeus, 1758)		*	*	*
	Oenopia lyncea lyncea (Olivier, 1808)		*		
	Platynaspis luteorubra (Goeze, 1777)			*	
	Rhyzobius litura (Fabricius, 1787)		*		*
	Rhyzobius lophantae (Blaisdell, 1892)			*	*
	Rodolia cardinalis (Mulsant, 1850)		*	*	*
	Scymnus abiandis (Paykull, 1798)	N			*
	Scymnus apandzi (Mulsant, 1846)	N		*	*
	Scymnus impexus (Mulsant, 1850)	N			*
	Scymnus interruptus (Goeze, 1777)			*	*
	Scymnus subvillosus (Goeze, 1777)				*
	Scymnus suturalis (Westman, 1795)	N		*	
	Standhorus punctillum (Weise, 1891)		*		
Corylophidae	*Arthrolips convexiuscula* (Motschulsky, 1849)				*
Curculionidae	*Brachyderes incanus* (Linné, 1758)		*		*
	Brachyderes pubescens (Boheman, 1833)		*	*	*
	Brachytemnus porcatus (Germar, 1823)		*	*	
	Ceutorhynchus pallidactylus (Marsham, 1802)		*		
	Coeliodes ruber (T.Marsham, 1802)			*	
	Lixus juncii (Boheman, 1835)	N	*	*	
	Microplontus rugulosus (J.F.W.Herbst, 1795)			*	
	Orchestes irroratus maroccanus (Roudier, 1954)		*		
Curculionidae	*Sitona callosus* (Gyllenhal, 1834)	N			*
	Sitona lineatus (Linnaeus, 1758)	N		*	
	Sitona lineellus (Bonsdorff, 1785)	N		*	
	Sitona longulus (Gyllenhal, 1834)	N		*	*
	Tychius cuprifer (Panzer, 1799)				*
	Tychius pusillus (Germar, 1842)			*	
Dasytidae	*Dasytes nigroaeneus* (Küster, 1850)		*	*	*
	Dasytes terminalis (Jacquelin du Val, 1863)		*	*	*
Dermestidae	*Anthrenus flavipes* (LeConte, 1854)			*	
	Anthrenus fuscus (Olivier, 1790)		*	*	*
	Anthrenus museorum (Linnaeus, 1761)			*	
	Anthrenus pimpinellae (Fabricius, 1775)				*
	Attagenus bifasciatus (Fabricius, 1787)		*	*	*
	Dermestes frischii (Kugelann, 1792)		*	*	*
	Orphilus niger (Rossi, 1790)			*	
	Trogoderma granarium (Everts, 1898)		*	*	
Dryopidae	*Dryops luridus* (Erichson, 1847)	N		*	
Elateridae	*Cardiophorus rufipes* (Buysson, 1902)	S	*	*	*
	Drasterius bimaculatus (Rossi, 1790)	S		*	
Erotylidae	*Triplax lacordairei* (Crotch, 1870)	R		*	
Geotrupidae	*Thorectes distinctus* (Marseul, 1878)		*	*	*
	Typhaeus typhoeus (Linnaeus, 1758)				*
Glaphyridae	*Anthypna meles* (Fabricius, 1792)		*	*	

Table 2. Countinued.

	Eulasia goudoti (Laporte, 1840)	E	*		
Histeridae	*Hypocaccus rugiceps* (Duftschmid, 1805)			*	
	Saprinus proximus simillimus (Wollaston, 1865)		*		
Hydraenidae	*Ochthebius bicolon* (Germar, 1823)	N			*
Hydrophilidae	*Cercyon obsolandus* (Gyllenhal, 1808)	N		*	
	Sphaeridium scarabaeoides (Linnaeus, 1758)	N		*	
Laemophloeidae	*Laemophloeus monilis* (Fabricius, 1787)	S			*
	Laemophloeus muticus (Fabricius, 1781)	N		*	
Latridiidae	*Corticarina curta* (Wollaston, 1854)			*	
	Enicmus transversus (Olivier, 1790)		*		
	Stephostethus productus (Rosenhauer, 1856)			*	
Meloidae	*Berberomeloe majalis* (Linnaeus, 1758)		*		
	Croscherichia paykulli (Billberg, 1813)		*		
	Hycleus rufipalpis (Escalera, 1909)		*		
	Mylabris variabilis (Pallas, 1781)			*	
Melolonthidae	*Euserica mamorensis* (Baraud, 1965)	E	*	*	*
	Hoplia africana (Escalera, 1914)			*	
	Hoplia bilineata (Fabricius, 1801)			*	
	Hoplia philanthus (Fuessly, 1775)		*	*	
	Sphodroxia Moroccana (Ley, 1923)	E			
Melyridae	*Aplocnemus virens* (Suffrian, 1843)	N	*	*	
	Colotes javeti (Jacquelin du Val, 1852)		*		
	Psilothrix viridicoerulea (Geoffroy, 1758)		*	*	
	Troglops furcatus (Perrin, 1885)			*	*
Mordellidae	*Mediimorda bipunctata* (Germar, 1827)			*	*
	Mordella aculeata (Linnaeus, 1758)		*	*	
	Variimorda villosa (Schrank von Paula, 1781)	N	*	*	
Nitidulidae	*Carpophilus hemipterus* (Linnaeus, 1758)			*	*
	Epuraea latipes (Grouvelle, 1896)			*	
	Meligethes aeneus (Fabricius, 1775)		*	*	*
	Meligethes viridescens (Fabricius, 1787)		*	*	*
Oedemeridae	*Chrysanthia viridissima* (Linnaeus, 1758)	N	*		
	Oedemera barbara (Fabricius, 1792)	S	*	*	*
	Oedemera marmorata (Erichson, 1841)			*	
Phalacridae	*Olibrus pygmaeus* (Sturm, 1807)		*	*	*
	Phalacrus coruscus (Panzer, 1797)			*	
Ptinidae	*Dignomus irroratus* (Kiesenwandter, 1851)	N	*	*	
	Stegobium paniceum (Linnaeus, 1758)	S	*	*	
Scarabaeidae	*Anisoplia baetica* (Erichson, 1847)			*	
	Anthoplia floricola (Fabricius 1787)			*	
	Aphodius diecki (Harold, 1870)			*	
	Blitopertha lineata (Fabricius, 1798)			*	
	Gymnopleurus flagellatus (Fabricius, 1787)		*		
	Gymnopleurus sturmii (MacLeay, 1821)	Rc	*		
	Onthophagus maki (Illiger, 1803)	Rc	*		
	Oxythyrea funesta (Poda, 1761)	S	*	*	
	Pleurophorus caesus (Creutzer, 1796)			*	
	Protaetia opaca (Fabricius, 1787)	R	*	*	
	Scarabaeus cicatricosus (P.H.Lucas, 1846)	Rc	*	*	*
	Scarabaeus sacer (Linnaeus, 1758)		*		
	Trichius zonatus (Germar, 1831)	R		*	
	Tropinota squalida pilosa (Brullé, 1832)		*	*	
Scolytidae	*Hypoborus ficus* (Erichson, 1836)			*	
	Platypus cylindrus (Fabricius, 1792)		*		*
	Xyleborus monographus (Fabricius, 1792)	S	*	*	
Scraptiidae	*Scraptia fuscula* (Müller, 1821)			*	
Staphylinidae	*Oxytelus sculptus* (Gravenhorst, 1806)	S	*	*	

Table 2. countinued

	Philonthus longicornis (Stephens, 1832)	N		*	
	Spedophilus marshami (Stephens, 1832)	N		*	
	Tachyporus hyponorum (Fabricius, 1775)			*	*
	Tachyporus nitidulus (Fabricius, 1781)	N		*	
	Xantholinus linearis (Olivier, 1795)		*	*	
Tenebrionidae	*Adelostoma sulcatum* (Duponchel, 1829)		*		*
	Boromorphus tagenoides (Lucas, 1846)			*	
	Cnemeplatia atropos (Costa, 1847)			*	
	Cossyphus hoffmanseggi (Herbst, 1797)			*	
	Gonocephalum granulatum granulatum (Fabricius, 1792)	E		*	
	Heliotaurus ruficollis tangerianus (Escalera, 1922)	E	*	*	
	Isomira melanophthalma (Lucas, 1846)		*	*	
	Latheticus oryzae (Waterhouse, 1880)				
	Pimelia chrysomeloides subris (Koch, 1941)	E, S	*		*
	Sepidium bidentatum (Solier, 1843)		*	*	
	Zophosis minuta (Fabricius, 1775)	S	*		*
Trogossitidae	*Temnoscheila caerulea* (Olivier, 1790)	N, R	*	*	
Zopheridae	*Endophloeus markovichianus* (Piller & Mitterpacher, 1783)	R		*	*

They contribute to nutrient cycling and organic matter decomposition, facilitating soil formation and forest habitat regeneration (Parisi *et al.*, 2020). These species are also recognized as valuable bioindicators of forest health, as their presence reflects the availability of deadwood and the continuity of forest ecosystems (Tsikas & Karanikola, 2020). Cavities and crevices in old trees, along with deadwood, provide essential breeding sites and food sources for these organisms (Micó, 2018). The rarity and threatened status of species provide valuable insights into the ecological balance and uniqueness of the cork oak forest in Larache amidst various anthropogenic pressures. These rare taxa are highly sensitive to environmental disturbances, with their often restricted distribution within geographic ranges making them ecologically valuable. They occupy specific habitats and have particular trophic requirements (Caprenato, 2015). The loss of this sensitive group can have negative impacts on ecosystem functioning, emphasizing the importance of conservation measures to ensure the sustainability of this ecosystem (Burner *et al.*, 2022a).

Endemic and new species

During this study, we identified 9 endemic species with limited spatial distribution capacities. These endemic species provide a unique perspective on the complexity and specificity of the cork oak forest ecosystem in Larache. Although their distribution may be restricted to specific areas, their local abundance underscores their key role in preserving the biological diversity of the region (Iorio *et al.*, 2022). These endemic species play a crucial role in maintaining biodiversity by contributing to the richness and complexity of the local flora and fauna, which are essential for sustaining a balanced and diverse ecological community. They often occupy specific ecological niches, interacting with other species such as pollinators, decomposers and predators, thereby helping to preserve the ecological functions of the cork oak forest of Larache.

Our inventory also reveals 33 species new to Morocco, according to the catalogue of beetle distribution in the Palaearctic region. It is important to clarify that these species are not necessarily "new" in the strict sense, but rather new to the Moroccan and regional context due to the lack of detailed prior inventories. This situation can be explained by several factors. On one hand, the region has undergone significant anthropogenic transformations since the 12th century, such as changes in land use, urbanization, and climate change (Ballouche, 2013), which have altered natural habitats and facilitated the appearance or migration of new species. On the other hand, some species may have been present in the region for a long time but were not previously identified due to a lack of reliable historical data or comprehensive surveys. Additionally, natural species redistributions in response to environmental changes could also explain the increased presence of certain species.

Conservation implications and recommendations

The heritage value of the cork oak forest in Larache underscores the necessity to implement effective protection measures against threats such as overgrazing, agricultural clearing, and excessive collection of deadwood. It is essential to enhance our understanding of the biology and behavior of the identified species. The preservation and restoration of suitable habitats for active beetle species are crucial. This entails protecting forested areas, ensuring an adequate amount of deadwood is left in situ and avoiding excessive clear-cutting, which supports the creation of complex and diverse microhabitats for beetles. Conservation management of forest ecosystems as a whole requires the designation of isolated, low-disturbance areas as biodiversity refuges (Gosselin & Pailland, 2017). These measures should be developed in close collaboration with management authorities, local communities, and stakeholders to ensure an effective approach for long-term biodiversity conservation across forested areas. It is therefore essential to establish a specific Red List of threatened species in Morocco and to periodically revise it. Creating such a list would significantly contribute to the conservation of regional biodiversity and guide management policies towards targeted actions. As key community decision-makers, their support for establishing a Red List for beetles enhances recognition of the heritage value of the Larache cork oak forest and demonstrates their commitment to preserving this environmental legacy.

Author's Contributions

Amine Samih: methodology, formal analysis, investigation, draft preparation, final review and edit, visualization and supervision. **Noureddin Maatouf**: supervision, methodology, project administration and funding acquisition. **Sergi Trócoli**: confirmed identification, final review and edit. **Hamza Habbaz**: formal analysis and references data. **Latifa Rohi**: supervision, project administration, final review and edit.

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Data Availability Statement

The specimens collected was deposited in the insect collection of the Centre for Innovation, Research, and Training - National Agency for Water and Forests, BP. 763, Rabat - Agdal, Morocco.

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Ethics Approval

Beetles were used in this study. All applicable international, national, and institutional guidelines for the care and use of animals were followed. This article does not contain any studies with human participants performed by any of the authors.

Conflict of Interest

The author declares that there is no conflict of interest regarding the publication of this paper.

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فهرست سخت‌بالپوشان جنگل بلوط‌پنبه لاراش، مراکش

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چکیده: جنگل بلوط‌پنبه لاراش، که بخش حیاتی از جنگل‌های بلوط‌پنبه سواحل اقیانوس اطلس در مراکش است، نقش حیاتی در حمایت از اکوسیستم‌های محلی و جوامع انسانی ایفا می‌کند. با این حال، این جنگل به‌طور فزاینده‌ای در معرض چالش هایی چون خطرکشاورزی فشرده و دیگر دست‌اندازی های بشر قرار دارد که منجر به نابودی زیستگاه‌های حشرات از جمله جوامع سوسک‌ها شده است. هدف از این مطالعه، تهیه فهرستی جامع از سخت‌بالپوشان در جنگل بلوط‌پنبه لاراش در طی دو سال متوالی (۲۰۲۱ و ۲۰۲۲) بود که از طریق بررسی سوسک‌های مرتبط با چشم‌اندازهای گیاهی مختلف با استفاده از تکنیک‌های مختلف تله‌گذاری (تله‌های گودال و تله‌های کاسه‌ای) و بررسی‌های مستقیم انجام شد. نتایج نشان از حضور ۱۸۰ گونه سوسک متعلق به ۳۷ خانواده داشت که شامل ۹ گونه بومی، ۳۳ گونه که به تازگی در مراکش ثبت شده اند، ۱۳ گونه سابروکسیلیک و ۱۰ گونه فهرست‌شده در فهرست سرخ شامل هفت گونه خشک‌دارزی (ساپروکسیلیک) و سه گونه سرگین خوار (کوپروفاگوس) هستند. این تنوع، اهمیت اکولوژیک جنگل بلوط‌پنبه لاراش را نشان می‌دهد و نیاز فوری به اعمال روش‌های حفاظتی و تقویت زیستگاه‌های مناسب برای حفاظت از این جوامع حشرات را برجسته می‌کند.

کلمات کلیدی: حفاظت، نمونه برداری، تنوع، آفریقا، حاشیه اقیانوس اطلس

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