

The Distribution of the HesperIIDae (Lepidoptera) Family in Romania

Cristina COSTACHE, Maria-Milena FILIP, Andrei CRIȘAN & László RÁKOSY

Summary: In Romania, 24 Skippers species have been reported so far, of which 14 found in the foothills zone, 6 found in the lowlands zone, 2 found in the montane zone, one found in the subalpine zone and one found in the alpine zone. The diagnosis, biology and ecology data, distribution density (known area), conservation status have been specified for each species. The distribution of each species in Romania is illustrated by maps, occurrences of each species were divided into three periods (1850-1950, 1950-1989, 1990-2018) using distinct symbols. *Muschampia cribrellum* and *M. tessellum*, two very rare species found in Europe, should be included in the list of protected lepidoptera of European Union.

Key words: Skippers, HesperIIDae, Romania

Introduction

Lepidoptera represents an important link in most terrestrial ecosystems. They are pollinators for plants, prey for avifauna, sensitive indicators (BECCALONI and GASTON 1995, OOSTERMEIJERE and VAN SWAAY 1998). Pollination represents a critical ecosystem service (OLLERTON *et al.* 2011, GARIBALDI *et al.* 2013). About 50% of European butterflies inhabit semi-natural grasslands maintained by traditional human activities (ERHARDT and THOMAS 1991).

All of the HesperIIDae species are important pollinators. They are related to the grassland habitat, being threatened with intensification and abandonment of land use and habitat fragmentation. Cessation of traditional grazing threatens biodiversity in Romania (CREMENE *et al.* 2005, SCHMITT and RÁKOSY 2007). The use of pesticides in agriculture and silviculture reaches protected areas, affecting massively the insect communities in Central Europe and Western Europe (HALLMANN *et al.* 2017). The decline of entomofauna is widespread globally (SÁNCHEZ-BAYO and WYCKHUYS 2019).

According to the latest version of the Romanian Lepidoptera Catalog (RÁKOSY and GOIA *in press*), Romania is one of the countries that has the highest number of Lepidoptera species with more than 4000 species, of which 204 are diurnal, distributed altitudinally from the Black Sea shore to 2300-2400 m (Fig. 1). However, in Romania, while the problem of habitat loss is also present, the lack of updated data lessens an appropriate action.

The purpose of this paper is to review the data

pertaining to the HesperIIDae family (Lepidoptera) living in Romania from most national and foreign available publications (Appendix 1). In addition, the Lepidoptera density distribution was considered, in order to present evidence in favor of proposing measures for the protection and conservation of endangered species.

Methods and materials

The distribution maps of the HesperIIDae over the Romanian territory were generated by compiling the data found in the literature known and accessible to us of faunistic or taxonomic nature, published from 1850 until recently, and those that attest the collection of any skipper. Specifically, data such as: species, location and date of collection, collector, as well as the number and sex of the specimens have been selected. Since GPS coordinates have been sparsely mentioned, we have inferred these data based on collection locations.

In addition to the published data, the following private collections have been examined in order to provide a more comprehensive assessment: László RÁKOSY (Cluj), Marin GOIA (Cluj), Levente SZÉKELY (Săcele, Brașov), Constantin CORDUNEANU (Botoșani) and museum collections: “Gr. Antipa” National Natural History Museum, Bucarest (collection “Dr. Doc Aurelian POPESCU-GORJ”, collection “Ludovic BEREGSZÁSZY”, collection “Dr. Levente SZÉKELY”, collection “Ioan LĂZĂRESCU”), Zoological Museum of the Babeș Bolyai University, Cluj (coll. PÉTERFI).

Some species may be missing from the regions with no data due to intensive farming, loss of habitats

through transformation into agricultural or urban land, etc. A more detailed study of this family in the south and east of the country is necessary in order to be able to accurately determine the area of the species and, if necessary, to implement appropriate protection and conservation measures.

Occurrences of each species were divided into three time intervals (1850-1950, 1950-1989, 1990-2018).

The maps were created using ArcGIS software (Environmental Systems Research Institute, 2015). Fig. 1 was generated using successively the following programs: ArcGIS (ESRI, 2015), Excel (MS Office, 2016) and Paint.net 4.2.6, based on the altitude data set, available on worldclim.com (HIJMANS *et al.* 2005).

The determinations were made according to the collections. The genetic determinations for the material that was available to us were from the collection of RÁKOSY, collection of PÉTERFI, and from newly collected data. In dubious specimens we have studied the genital armature for correct diagnosis. In order to avoid the confusion generated by some problematic species, data from published museum collection was used.

Carterocephalus palaemon (PALLAS, 1771)

Diagnosis

It is an unmistakable species in Romanian fauna.

Biology and Ecology

Carterocephalus palaemon is a univoltine species. The life cycle of the chequered skipper starts in mid - May and ends slightly before July of the following year (RÁKOSY 2013). Males exhibit a very territorial

behavior. Most males choose multiple perches in order to guard and catch any potential mates that pass through their territory. It is a woodland species but it can be found in bogs, at the edges of streams and at grassy forest openings (EBERT and RENNWALD 1991). The nectar sources for adults consist in *Ajuga reptans*, *A. genevensis*, *Sanguisorba minor*, *Sambucus racemose*, *Urtica dioica*, *Potentilla reptans*, *Trifolium repens*, *Potentilla reptans*, *Galium verum* (EBERT and RENNWALD 1991, LAFRANCHIS *et al.* 2015).

Distribution

C. palaemon is a holarctic species (KUDRNA *et al.* 2011). In Romania it can be found in the center, west, north, north-east of the country (Fig. 2) It prefers higher altitudes and can be found as high as 1800 m.

Conservation

In Romania its status of conservation is least concern as in all the EU countries. (VAN SWAAY *et al.* 2014, RÁKOSY *et al.* *in press*).

Heteropterus morpheus (PALLAS, 1771)

Diagnosis

It is an unmistakable species in Romanian fauna.

Biology and Ecology

Heteropterus morpheus is a univoltine species. The butterfly flies from May to June, depending on the location. Adults can be found at the edges of streams and grassy forest openings (RÁKOSY 2013).

Distribution

It's an Eurasiatic species, found in the center, northern and southern Europe (KUDRNA *et al.* 2011). The species is found from Spain to Mongolia, north of

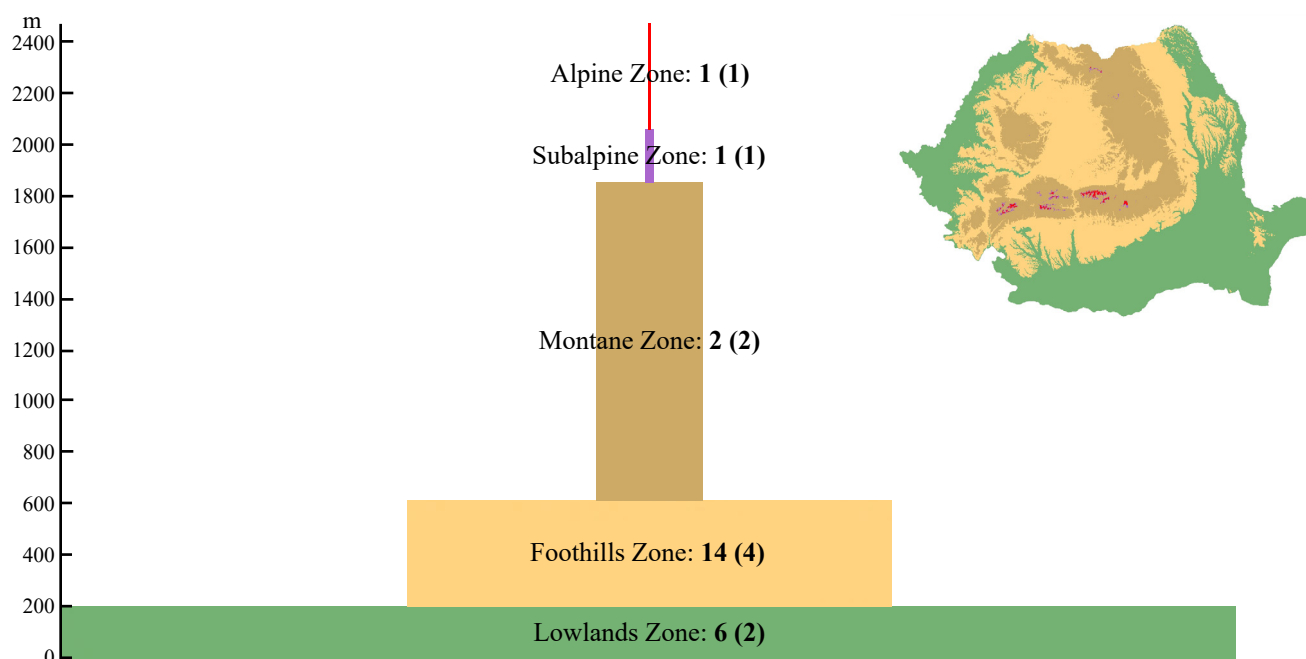


Fig. 1. The distribution by altitudinal levels of the 24 Romanian Skippers taxa. Conventionally, five zones were considered: between 0-200 m, the lowlands zone (42% of the Romanian territory); between 200-600 m, the foothills zone (35% of Romanian territory), between 600-1800 m, the montane zone (22% of the Romanian territory); between 1800-2000 m, the subalpine zone (0,3% of the Romanian territory) and over 2000 m, the alpine zone (0,2% of the Romanian territory). Between brackets: the number of species that may occur in other altitudinal zones; outside brackets: the species characteristic of that level.

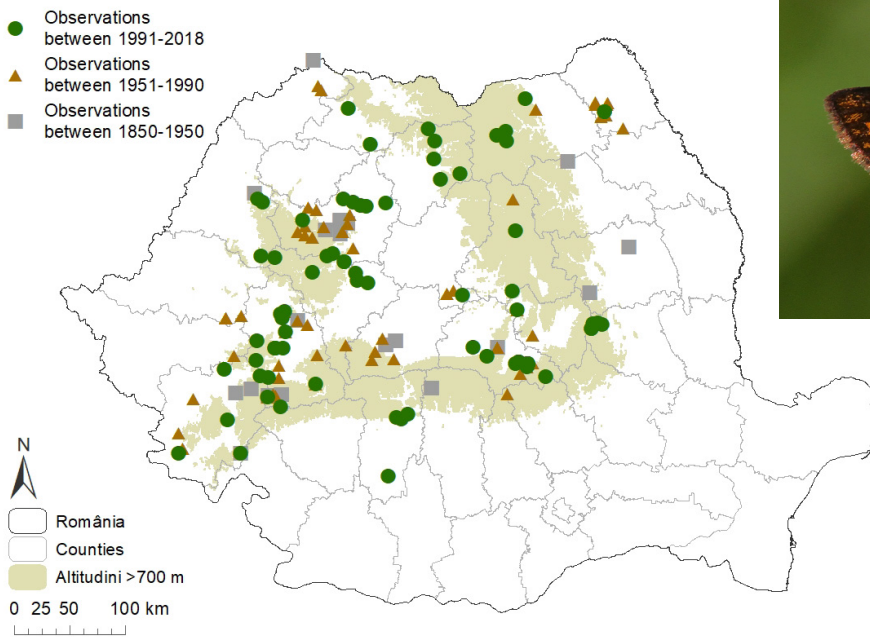


Fig. 2. Distribution map of *Carterocephalus palaemon* in Romania

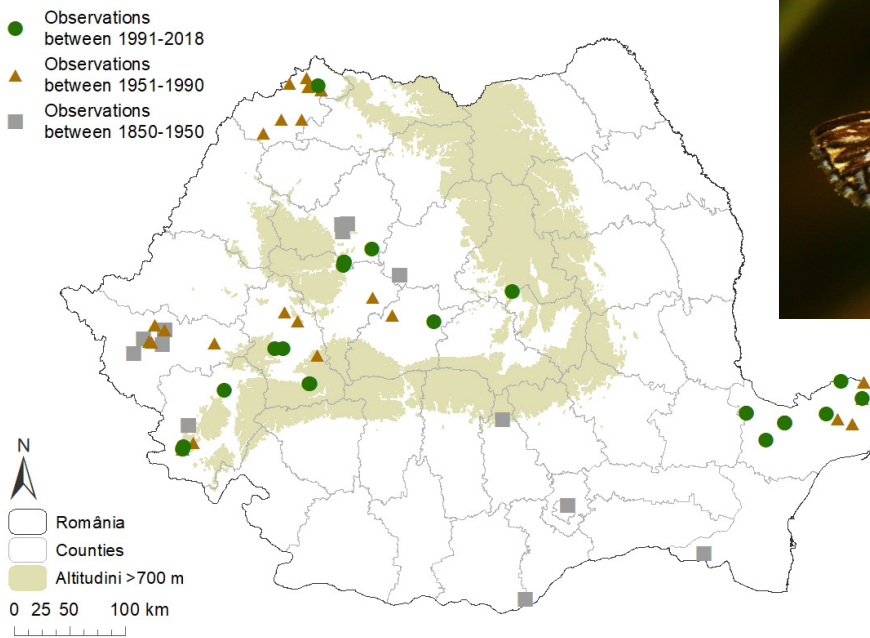


Fig. 3. Distribution map of *Heteropterus morpheus* in Romania

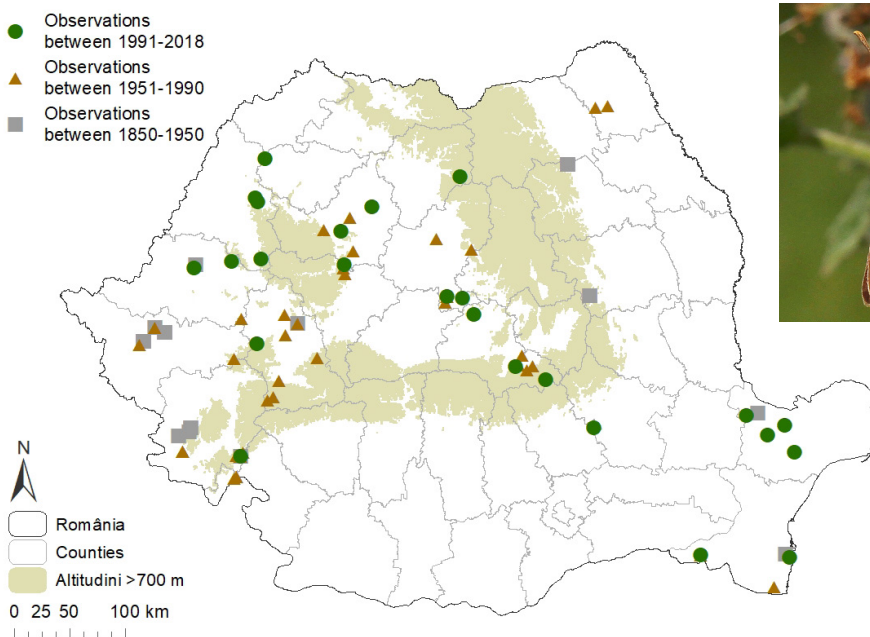


Fig. 4. Distribution map of *Thymelicus acteon* in Romania

China and Korea (TUZOV 1997).

In Romania, *H. morpheus* has become increasingly rare over the past 50 years. It is more present in Banat and the Danube Delta (Fig. 3).

Conservation

The IUCN European status of *Heteropterus morpheus* is least concern. The Romanian Red List status is least concern but in some regions the status is near threatened. The worst threat is the habitat loss (VAN SWAAY *et al.* 2014, RÁKOSY *et al.* *in press*).

Thymelicus acteon (ROTTEMBURG, 1775)

Diagnosis

The upper and front of wings are distinguished by two yellow-orange spots, elongated and adjacent, on a brown background. On the outside there is a row of seven spots, also yellow-orange. Spots are more pronounced in females. In males, the spots are less colorful and their observation depends on an appropriate light angle. The males have androconial scales on the upper wings. The bottom of the wings is yellow and may have some light-yellow spots. Species determination is based on genital armature diagnosis, since *Thymelicus acteon*, *T. lineola* and *T. sylvestris* are similar in terms of external morphology.

Biology and Ecology

The adult flies from mid-June to mid-August (RÁKOSY 2013). Males prefer *Prunus spinosa* and *Scabiosa coumbaria*, from where it can monitor its territory (EBERT and RENNWALD 1991, HESSELBARTH *et al.* 1995).

Habitats are primarily on unfertilized calcareous grassland this includes chalk downland, and undercliffs.

Distribution

The species occurs locally across Central Europe, Asia Minor and North Africa. It can be found from 0 to 1800 m.

In Romania *Thymelicus acteon* can be found in almost every region, missing from Oltenia and Maramures (Fig. 4).

Conservation

The IUCN European status of *Thymelicus acteon* is least concern. The Romanian Red List status is near threatened. In Romania the worst threat is agriculture, pesticides and overgrazing (RÁKOSY *et al.* *in press*).

Thymelicus lineola (OCHSENHEIMER, 1808)

Diagnosis

The color of the top of the wings varies from dark brown to orange-yellow. Both the edges and outer ribs of the wings are dark brown to black. There is a relationship between altitude and color intensification of ribs: the higher the altitude – the darker the margins and the ribs. *Thymelicus lineola* has morphological similarities with *T. sylvestris*, except the color of the lower part of the distal end of the antennae. In *T.*

sylvestris it is brown to orange, while at *T. lineola* the end is black.

Biology and Ecology

Thymelicus lineola shares the same habitat with *T. sylvestris*. They both prefer areas rich in flowers such as meadows and grassy forest openings.

Adults fly from June to August (RÁKOSY 2013). Depending on the altitude it can have one or two broods of offspring per year.

Distribution

Thymelicus lineola is a holarctic species (KUDRNA *et al.* 2011). It can be found as high as 2200 m. It is found from southern Scandinavia through Europe to North Africa and from eastern to Central Asia.

In Romania it is found in all the historical regions (Fig. 5).

Conservation

In Romania its status of conservation is least concern as in all the EU countries (VAN SWAAY *et al.* 2014, RÁKOSY *et al.* *in press*).

Thymelicus sylvestris (PODA, 1761)

Biology and Ecology

The habitat distribution is wide but it prefers sunny cliffs, meadows and grassy forest openings that are little fertilized.

Adults fly from June to August (RÁKOSY 2013). The preferred food plants are *Hypericum perforatum*, *Geranium robertianum*, *Inula hirta*, *Vicia faba*, *Viola tricolor*, *Salvia nemerosa*.

Distribution

This butterfly's range includes much of Europe (east to the Urals, including Ireland, Britain and Scandinavia), north Africa and the Middle East. It typically occurs where grass has grown tall. In Romania it is found in every region but missing from the southern part (Fig. 6). It prefers high altitudes (1500 m).

Conservation

In Romania its status of conservation is least concern as in all the EU countries (VAN SWAAY *et al.* 2014, RÁKOSY *et al.* *in press*).

Hesperia comma (LINNAEUS, 1758)

Biology and Ecology

It prefers warm calcareous sites, rich in *Festuca ovina*. Adults prefer *Leucanthemum vulgare*, *Galium verum*, *Thymus serpyllum*, *Thymus comosus*, *Viola tricolor*, *Mentha longifolia*, *Lotus corniculatus* (EBERT and RENNWALD 1991, LAFRANCHIS *et al.* 2015).

Distribution

Hesperia comma is a holarctic species (KUDRNA *et al.* 2015). It has a wide distribution as far south as North Africa, northwards throughout Europe to the Arctic and eastwards across Asia to China and Japan. It is found as high as 2300 m (TOLMAN *et al.* 2001).

In Romania it was found in Transylvania, Banat, Dobrogea and northern Moldova (Fig. 7). It is found

as high as 1400 m.

Conservation

In Romania its status of conservation is least concern as in all the EU countries (VAN SWAAY *et al.* 2014, RÁKOSY *et al. in press*).

Ochlodes sylvanus (ESPER, 1777)

Diagnosis

Ochlodes sylvanus resembles morphologically with *Hesperia comma*. The main differences are the androconic spots, which are totally black and the faded yellow-brown spots on the upper side of the rear wings.

Biology and Ecology

Ochlodes sylvanus is a univoltine species, the adults fly from mid-May to August.

It can be found anywhere where wild grasses grow tall. It prefers hedgerows, woodland clearings and edges (RÁKOSY 2013). The food plants listed are *Hypericum perforatum*, *Aster amellus*, *Leucanthemum vulgare*, *Trifolium pratense*, *Trifolium repens*, *Genista sagittalis*, *Thymus sp.*, *Sambucus nigra*, *Centaureum umbellatum*, *Sambucus racemosa*, *Telekia speciosa*, *Cirsium sp.*, *Carduus sp.* (RÁKOSY 2013).

Distribution

This species occurs throughout Europe, in the East Palearctic ecozone (northern Asia, China and Japan) and in the Nearctic realm (KUDRNA *et al.* 2015).

In Romania it is found in all regions as high as 1600 m (Fig. 8).

Conservation

In Romania its status of conservation is least concern as in all the EU countries (VAN SWAAY *et al.* 2014, RÁKOSY *et al. in press*).

Erynnis tages (LINNAEUS, 1758)

Biology and Ecology

It prefers a variety of habitats including chalk downland, woodland clearings, coastal dunes, railway lines and waste ground.

It has two broods of offspring per year. The adults fly from April to August (RÁKOSY 2013).

The foodplants are *Medicago lupulina*, *Melilotus officinalis*, *Trifolium campestre*, *Hypericum perforatum*, *Leucanthemum vulgare*, *Dianthus carthusianorum*, *Agrimonia eupatoria*, *Linaria vulgaris*, *Rorippa sylvestris*, *Bunias orientalis*, *Hesperis tristis*, *Cardamine pratensis*, *Cardaminopsis arenosa*, *Arabis turrata*, *Alyssum petraeum*, *Dianthus carthusianorum*, *Leucanthemum vulgare* (EBERT and RENNWALD 1991, Hesselbarth *et al.* 1995, LAFRANCHIS *et al.* 2015).

Distribution

It is found from Europe across Asia Minor and Central Asia to the Amur region. In Romania it is found in every region, as high as 1600 m (fig. 9).

Conservation

In Romania its status of conservation is least concern as in all the EU countries (VAN SWAAY *et al.* 2014, RÁKOSY *et al. in press*).

Carcharodus alceae (ESPER, 1780)

Biology and Ecology

These quite common butterflies prefer dry warm and stony areas, wasteland, warm ruderals and gardens. In Romania it has three or more generations (RÁKOSY 2013).

They get nectar from various herbaceous plants *Ajuga reptans*, *Lamium purpureum*, *Vinca minor* and on wet soil or excrements (RÁKOSY 2013).

Distribution

This species can be found in most of southern and central Europe, in northern Africa (Morocco east to Tunisia and Libya), in the Middle East, in Asia Minor, the Caucasus, in northern India, in the Middle and Central Asia, in the western Himalayas and in the south of Western Siberia as high as 2000 m.

In Romania it is found in Transylvania, Banat, Moldova, Dobrogea, northern Crișana region and in Maramureș as high as 1300 m (Fig. 10) (RÁKOSY 2013).

Conservation

The IUCN European status of *Carcharodus alceae* is least concern. The Romanian Red List status is also least concern but the population is in slightly decline since 2000 due to agriculture and habitat loss (RÁKOSY *et al. in press*).

Carcharodus lavatherae (ESPER, 1783)

Biology and Ecology

It is a xero- and xeromesophilic species. It prefers grasslands with *Stachys sp.* and limestone or clay-sandy soil. The ideal habitats are 2-3 years old lawns and rocky lawns, located at altitudes lower than 700 m (RÁKOSY 2013). It is a univoltine species and flies from the end of May to the end of July.

Butterflies often sit on the ground or rocks, being excellent camouflaged. They extract mineral salts from wet soil, excrements or small animal corpses.

Distribution

It is found from the Rhine Rift Valley in central Germany up to North Africa and from south-eastern France up to Anatolia as high as 200 - 1600 m (TOLMAN *et al.* 2001).

In Romania it is found in Transylvania, Carpathian Mountains, Clisura Dunării, Cheile Nerei and Valea Cernei at an elevation between 100 - 1300 meters above sea level (RÁKOSY 2013) (Fig. 11).

Conservation

The IUCN European status of *Carcharodus lavatherae* is least concern. In Romania it is near threatened due to habitat loss and overgrazing (RÁKOSY 2013, RÁKOSY *et al. in press*).

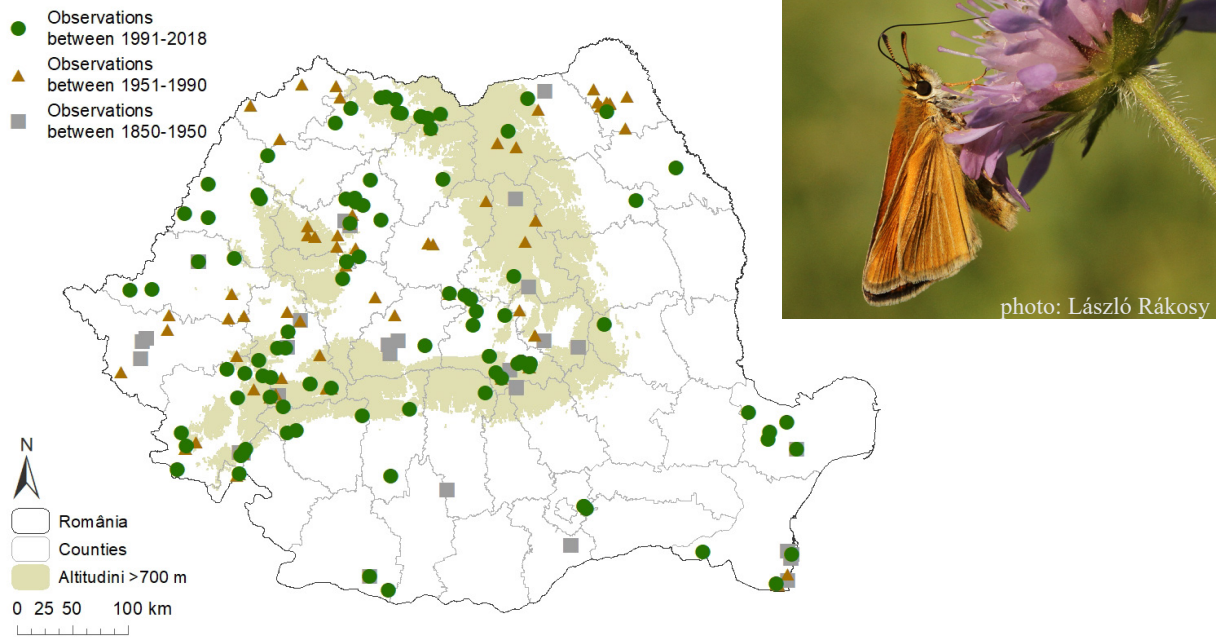


Fig. 5. Distribution map of *Thymelicus lineola* in Romania

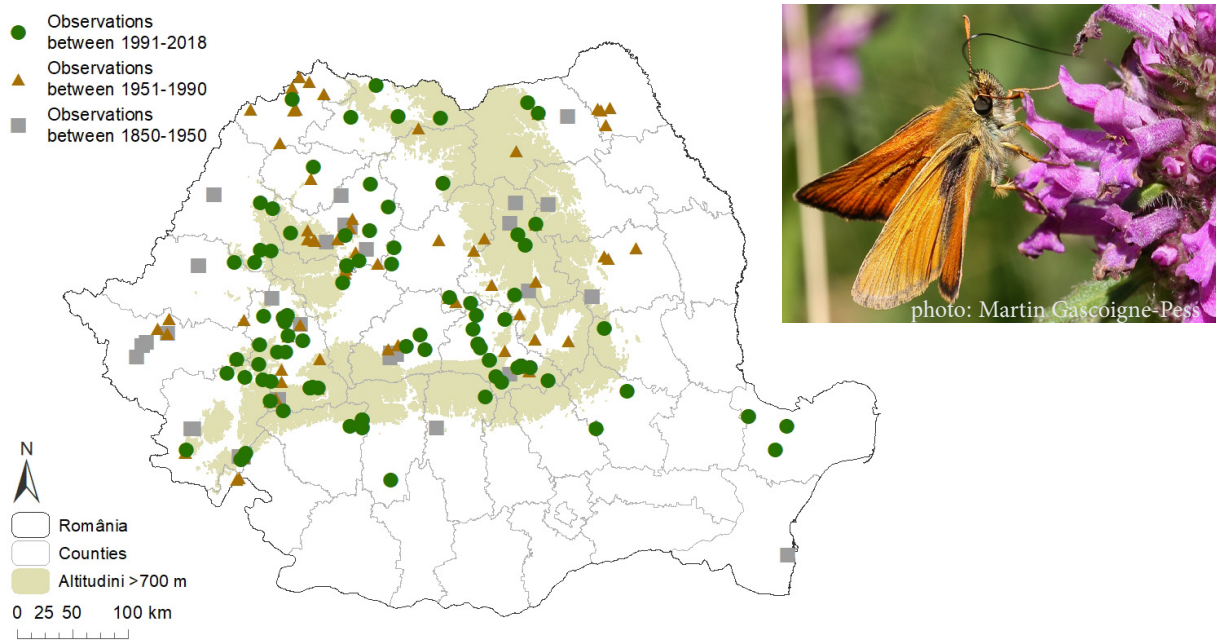


Fig. 6. Distribution map of *Thymelicus sylvestris* in Romania

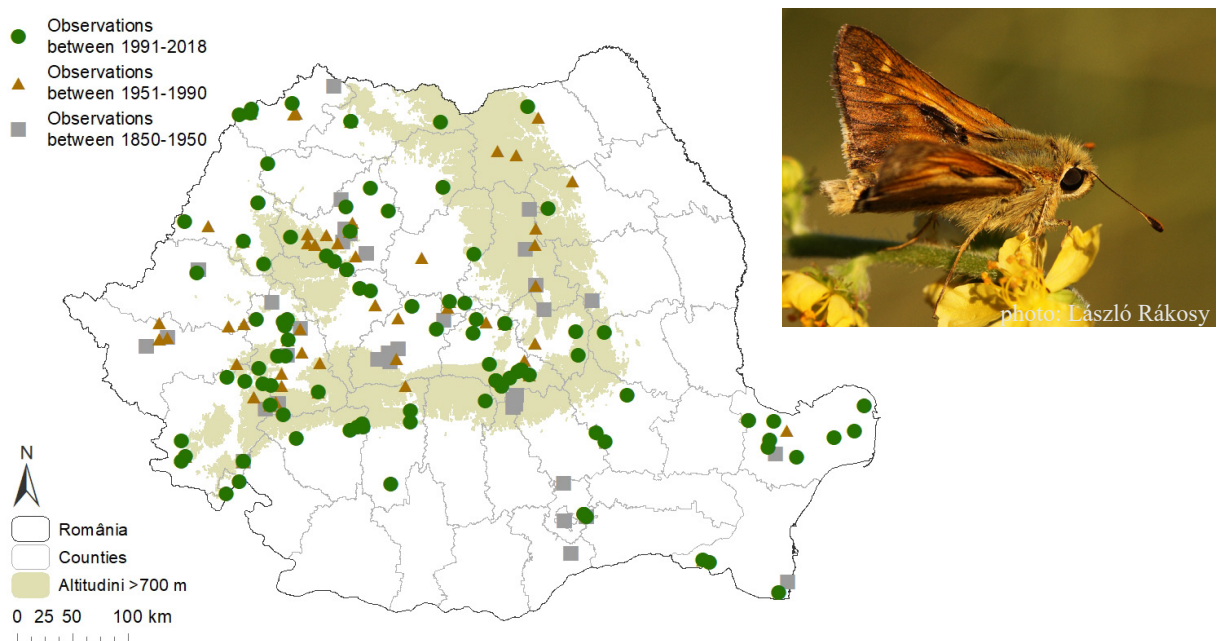


Fig. 7. Distribution map of *Hesperia comma* in Romania

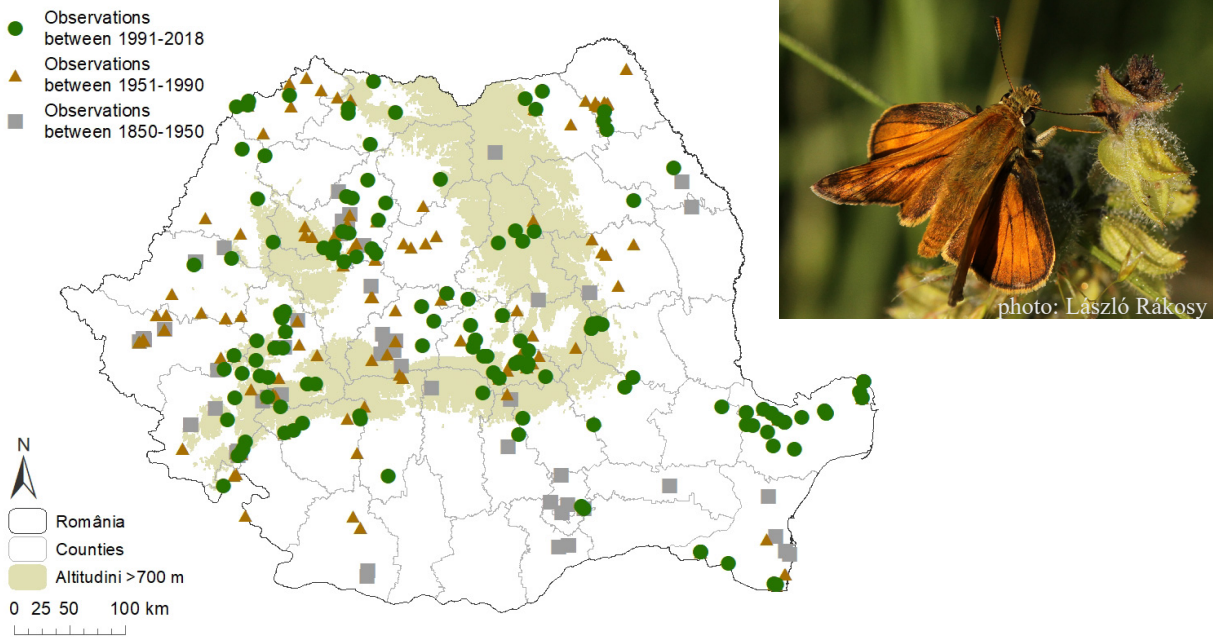


Fig. 8. Distribution map of *Ochloides sylvanus* in Romania

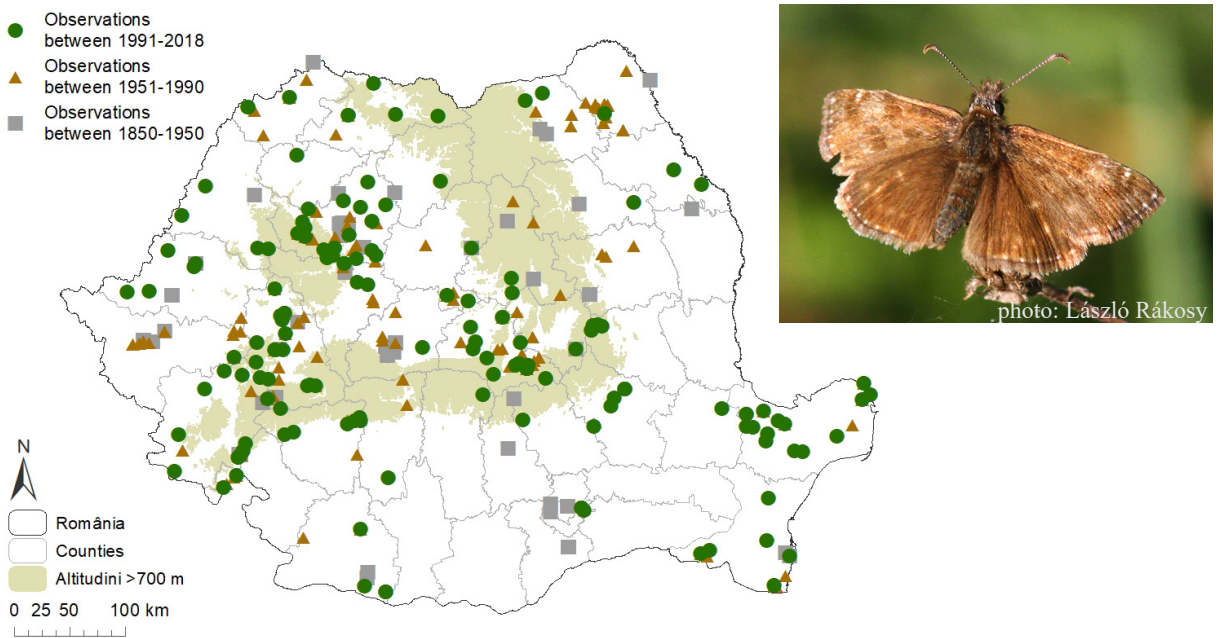


Fig. 9. Distribution map of *Erynnis tages* in Romania

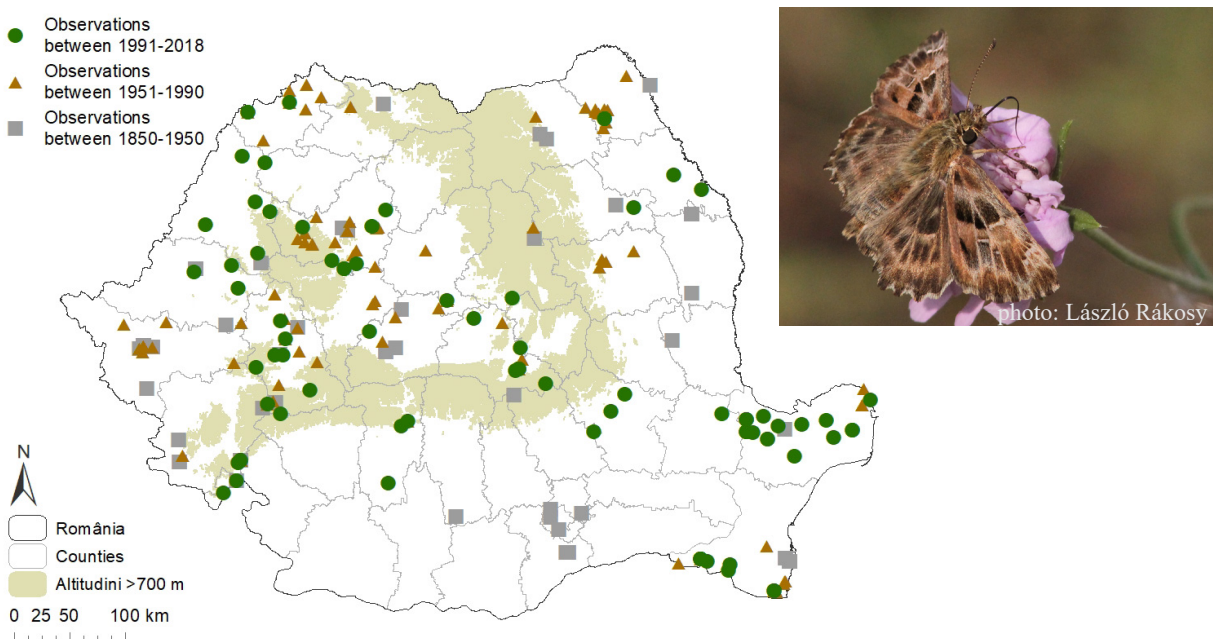


Fig. 10. Distribution map of *Carcharodus alceae* in Romania

***Carcharodus flocciferus* (ZELLER, 1847)**

Diagnosis

It is very similar to *C. alceae* - the color of the top of the wings is dark-brown, the six white spots well contrasted on the front wings. It is distinguished by the presence of three white spots on the posterior wings, narrower than those of *C. lavatherae* (SETTELE *et al.* 2015). The dimension of the upper wing resembles *C. orientalis* (TOLMAN *et al.* 2001). It is advisable to study the genital armature to confirm the accuracy of the diagnosis.

Biology and Ecology

The species is common in wet habitats, such as flooded meadows, which dry out during summer, and in mesophilic or xero-thermophilic habitats, for example steppe meadows on limestone cliffs. It is a univoltine species found as high as 800 m and bivoltine in plain and hilly regions (RÁKOSY 2013).

Adults fly from May to June or July to August in two generations. It feeds on *Linum flavum*, *Lamium album*, *Origanum vulgare*, *Malva officinale* etc.

Distribution

This species can be found in the Mediterranean region, the Alps and the Balkans, from southern and central Europe. In Romania it is found in all the historical regions (Fig. 12).

Conservation

The IUCN European status of *Carcharodus flocciferus* is least concern. In Romania it is near threatened and vulnerable due to overgrazing and habitat loss (RÁKOSY *et al. in press*).

***Carcharodus orientalis* (REVERDIN, 1913)**

Biology and Ecology

Carcharodus orientalis prefers habitats such as limestone-steppe meadows, bushes, and anthropogenic habitats - ditches and road edges, abandoned quarries (RÁKOSY 2013). It is bivoltine in Dobrogea, the first-generation flies from mid-May to July and the second-generation flies from July to the end of September (RÁKOSY and VARGA 2000).

Distribution

The species has a Balkan Pontic-Caspian distribution (HESSELBARTH *et al.* 1995, TUZOV 1997, RÁKOSY and VARGA 2000). It is also found in northern Iran as high as 1650 m (TOLMAN *et al.* 2001).

In Romania it is found in Dobrogea and North Moldova as high as 450 m (Fig. 13).

Conservation

The IUCN European status of *Carcharodus orientalis* is least concern. In Romania this species has a status of least concern - near threatened because of overgrazing and habitat loss (RÁKOSY *et al. in press*).

***Spialia orbifer* (HÜBNER, 1823)**

Biology and Ecology

Adults are on wing from April to August in one or two

generations per year.

The habitat consists of steppe on plains and grassy slopes (RÁKOSY 2013).

Adults feed on nectar from flowers such as *Lotus corniculatus*, *Centaurea* sp., *Scabiosa* sp. (EBERT and RENNWALD 1991, HESSELBARTH *et al.* 1995).

Distribution

It is found from south-eastern Europe and temperate Asia to Korea. In Romania it is found in Dobrogea, the Southern Carpathians, the Curvature Carpathians and Izvorul Mureşului. Surprisingly, this species has not been reported in Transylvania. In Romania it is found as high as 900 m (Fig. 14).

Conservation

The IUCN European status of *Spialia orbifer* is least concern. In Romania its status is least concern - near threatened (VAN SWAAY *et al.* 2014, RÁKOSY *et al. in press*).

***Muschampia cribrellum* (EVERSMANN, 1841)**

Diagnosis

The species is much like *M. tessellum*. It is distinguished by the stronger contrast of white spots on the brown or dark-gray side of the ventral and dorsal side of the wings through the 5 spots in the lower subapex region of the anterior wings (2: 1: 2 in *M. cribrellum*, 2: 0: 2 to *M. tessellum*) and the group of 4-5 spots in the upper postal region of all previous wings (*M. tessellum* has 3) (RÁKOSY 2013). The genital armature is recommended for correct diagnosis.

Biology and Ecology

Adults fly from May to June. The species has only one generation per year. It is a species of dry grasses.

Distribution

It is a Euro-Siberian species, found from south-eastern Europe, the Caucasian region, southern Siberia, southern Ural Mountains, Kazakhstan, Altai, Mongolia, Amur region, North and West of China (RÁKOSY 2013, TOLMAN *et al.* 2001).

There are known populations in Cluj, Sălaj, Mureş, Harghita, Hunedoara. In Romania it is found as high as 100 - 800 m (Fig. 15).

Conservation

The IUCN European status of *Muschampia cribrellum* is near threatened all over Europe (VAN SWAAY *et al.* 2010). In Romania the species is classified as endangered and is protected by law since 2005 (VAN SWAAY *et al.* 2014, RÁKOSY *et al. in press*).

***Muschampia tessellum* (HÜBNER, 1803)**

Biology and Ecology

It is a xero-thermophilic species and it has ecological preferences similar to *M. cribrellum*. It is found in steppe meadows on limestone or clay-sandy soil, grasslands with high vegetation, hedges, as well as in overburdened or slightly ruderalized habitats (RÁKOSY 2013). In Romania (Transylvania) it is bivoltine and it flies from middle of May until the end of June

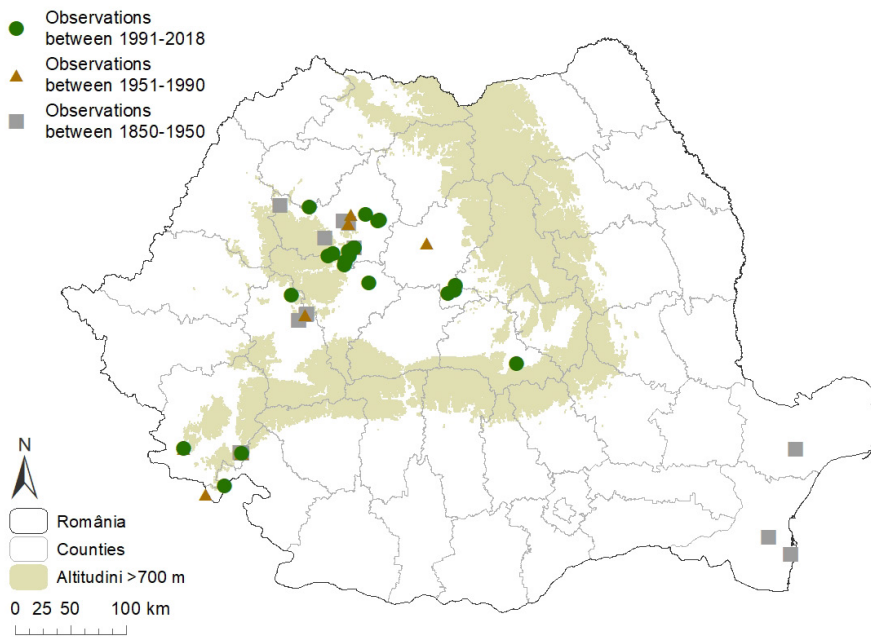


Fig. 11. Distribution map of *Carcharodus lavatherae* in Romania

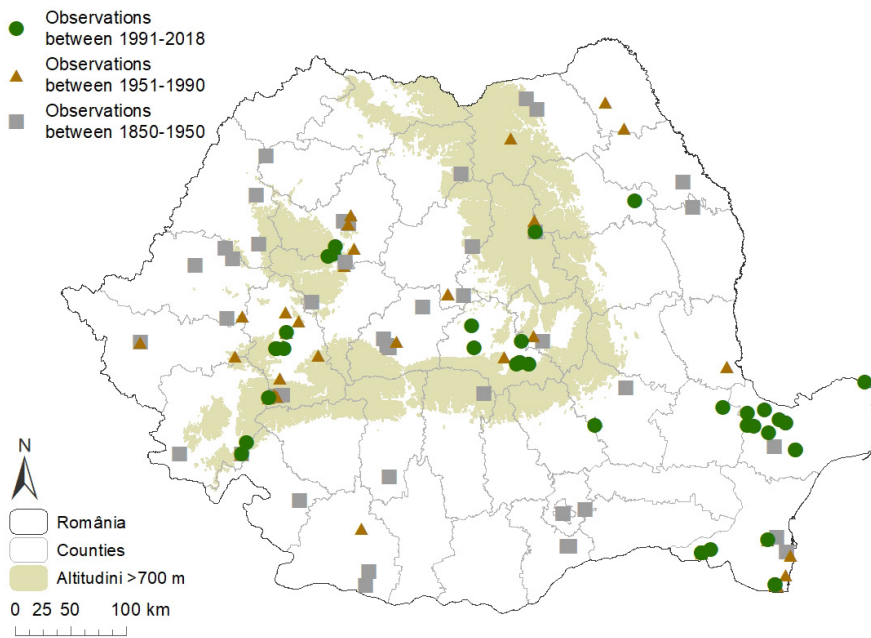


Fig. 12. Distribution map of *Carcharodus flocciferus* in Romania

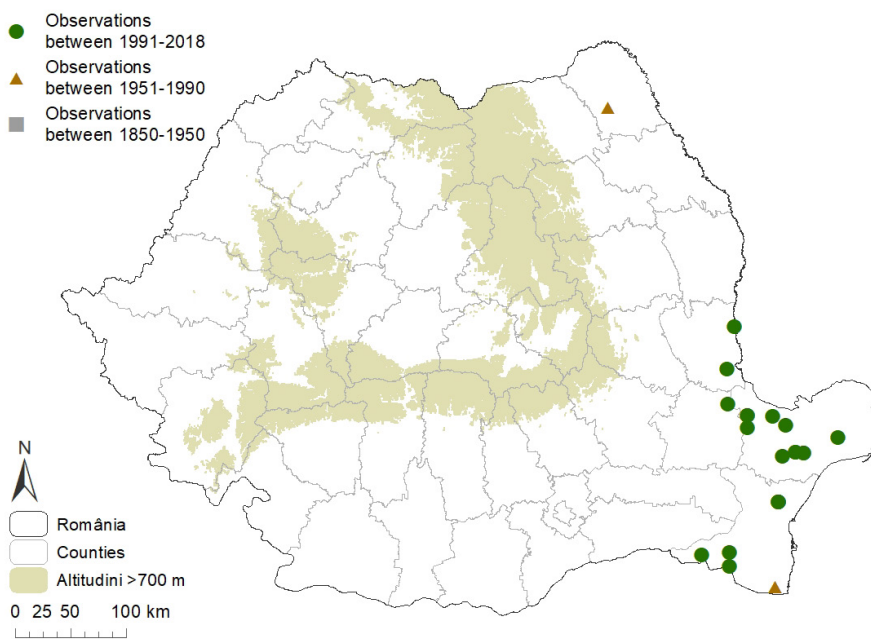


Fig. 13. Distribution map of *Carcharodus orientalis* in Romania

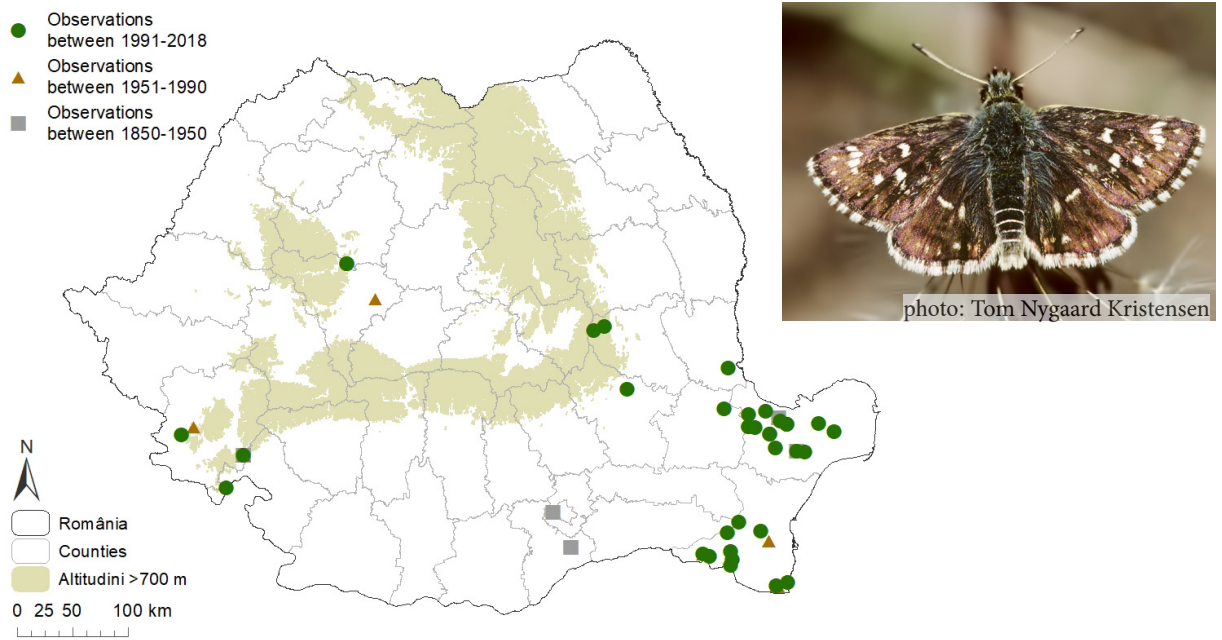


Fig. 14. Distribution map of *Spialia orbifer* in Romania

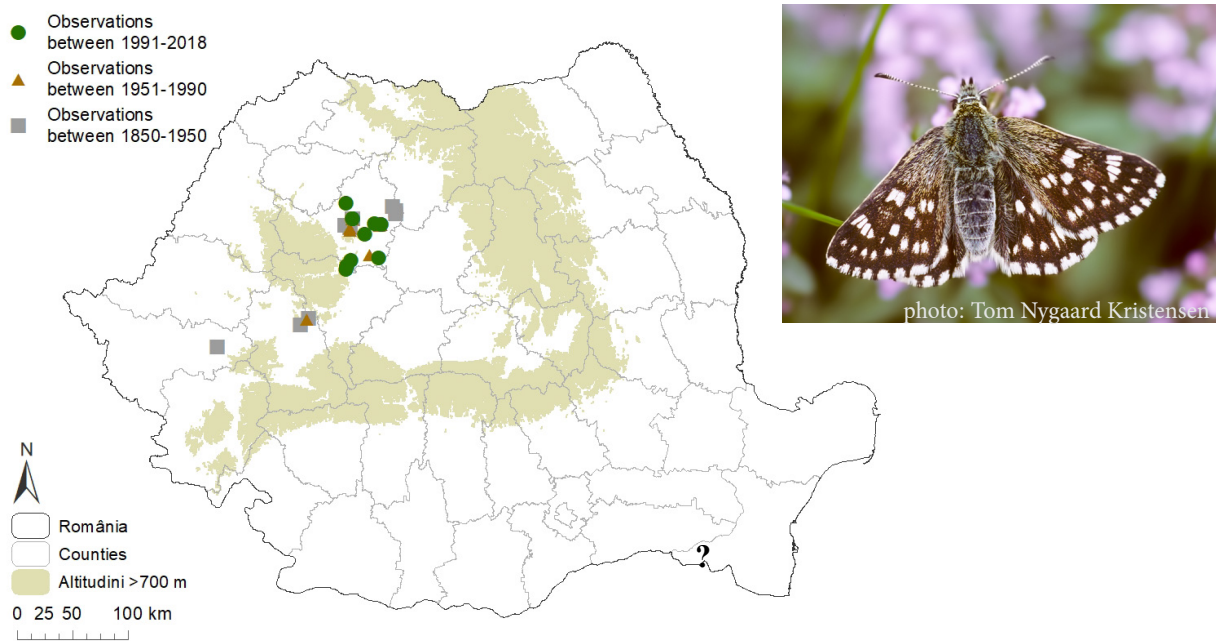


Fig. 15. Distribution map of *Muschampia cribrellum* in Romania

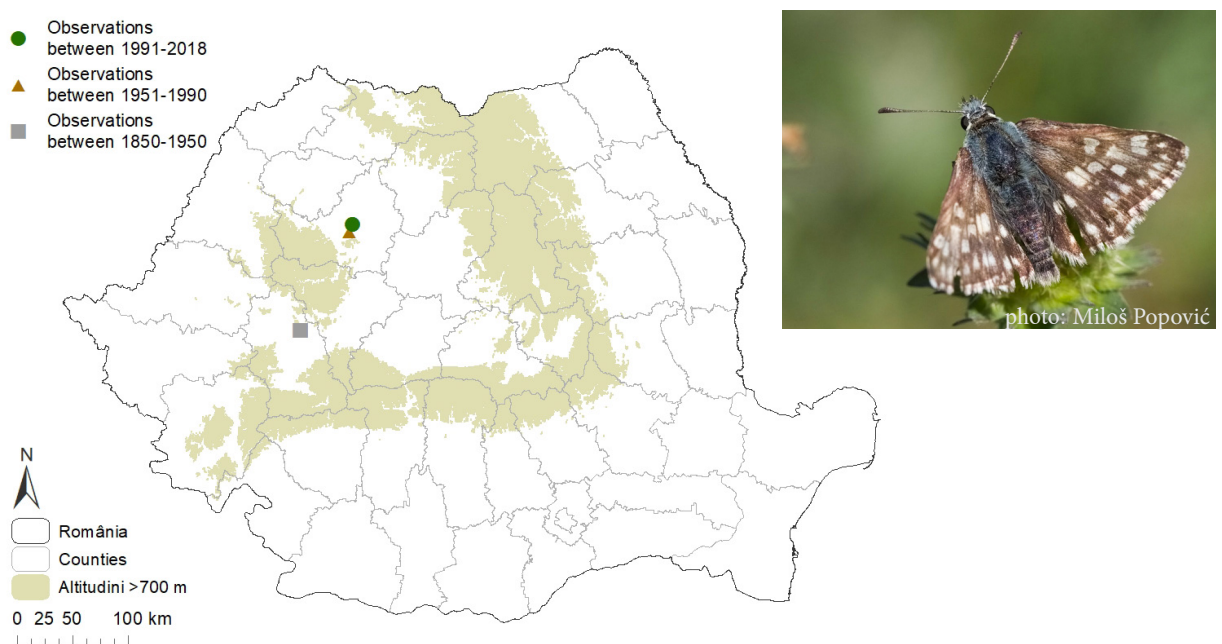


Fig. 16. Distribution map of *Muschampia tessellum* in Romania

and from the end of July to August (RÁKOSY 2013; RÁKOSY and GOIA 1997). In the rest of the area, the species is univoltine and flies from mid-May to mid-August (TOLMAN *et al.* 2001). Males have territorial behavior. In Transylvania larvae live on *Phlomis tuberosa* (RÁKOSY 2013). Adults feed preferentially with nectar of *Thymus* sp., *Vicia* sp., *Phlomis* sp. and *Achillea millefolium* (VAN SWAAY *et al.* 2014).

Distribution

It is found from the southern Balkan Peninsula (Macedonia, Bulgaria, Greece and the European part of Turkey) through Ukraine and Asia Minor, southern Siberia, Mongolia, east to the Amur region (TOLMAN *et al.* 2001, VAN SWAAY *et al.* 2010). In Romania the species was reported only in Transylvania, Săcărâmb and Fânațele Clujului. It is found between 350 and 650 meters. The recording of the species from Săcărâmb is very old (FUSS 1850). The only population with recent reports is known from Fânațele Clujului (Fig. 16). Unfortunately, the population from Fânațele Clujului is extremely scarce, the species being threatened with extinction.

Conservation

The IUCN European classified the species as LC and it is not considered necessary to take protective and conservation measures (VAN SWAAY *et al.* 2014). In Romania the populations are very small and isolated, resting in the Transylvanian region, and have led to the classification of the taxon as critically endangered (RÁKOSY *et al. in press*).

Pyrgus malvae (LINNAEUS, 1758)

Diagnosis

With its characteristic chequered black-and-white pattern, the grizzled skipper is quite distinctive. It is small, with an average wingspread of 12 millimeters. On the ventral side of the posterior wings, the ribs are evident due to the color of the white to creamy color, and the spots are white. The lower part of the distal end of the antennae is dark brown. It is the smallest butterfly in the *Pyrgus* genus in Romania (Pro Natura 2000).

Biology and Ecology

Pyrgus malvae is a meso-xerophilic species with a wide range of habitats, including ruderal. It can be found in any type of meadows, but they prefer those with a mosaic structure, limestone or sandy soil, abundant in flowers and airy vegetation (RÁKOSY 2013). It is bivoltine up to 700 m and univoltine up to over 1500 m altitude. Adults fly from mid-April to late June and from July to mid-September (RÁKOSY 2013). Adults were seen on *Salvia nemorosa*, *Leucanthemum vulgare*, *Hypericum perforatum*, *Senecio vulgaris*, *Galium verum*, *Solidago virgaurea*, *Potentilla reptans*, *Silene vulgaris*, *Cardamine pratensis*, *Hesperis tristis*, *Cardaminopsis arenosa*, *Alyssum alyssoides*, *Fragaria vesca*, but also on animal excrement and moist soil (EBERT and RENNWALD 1991, LAFRANCHIS

et al. 2015).

Distribution

Pyrgus malvae has a eurasiatic distribution (KUDRNA *et al.* 2011). It is found as high as 1600 m. It occurs in Europe, northwestern Turkey, Mongolia, northern China and Korea, in southern and south-west France, southern Switzerland as well as in Italy (TOLMAN *et al.* 2001, RÁKOSY 2013). In Romania it is found in all the historical regions (Fig. 17).

Conservation

In Romania its status of conservation is least concern as in all the EU countries (VAN SWAAY *et al.* 2014, RÁKOSY *et al. in press*).

Pyrgus armoricanus (OBERTHÜR, 1910)

Diagnosis

Like all *Pyrgus* species, it can be very difficult to identify in the field. The upper side of the forewings are often noticeably darker brown than other *Pyrgus* species, especially when fresh, with clear white markings. It resembles other grizzled skipper (*P. alveus*). It is slightly bigger than *Pyrgus malvae*. This species is quite similar to *Pyrgus carthami*, *Pyrgus alveus*, *Pyrgus serratulae* and *Pyrgus malvae*.

Biology and Ecology

They are found in wet habitats with southern exposure (peatlands, marshlands). However, they prefer grasslands with low vegetation, vegetation-covered rocks and pastures in the hilly-mountainous area (RÁKOSY 2013). Males have a territorial behavior (EBERT and RENNWALD 1991). They are bivoltine and fly from mid-May to late June and from August to late September (RÁKOSY 2013).

Distribution

It has a west Palearctic distribution (KUDRNA *et al.* 2011). It is found in northern Africa, Europe, Turkey, the Transcaucasian, Northwest Asia and Southern Ural.

In Romania it is found in Dobrogea, Carpathians, Transylvania, Banat, Maramureș, Bucovina and Moldova as high as 1450 m (Fig. 18).

Conservation

In Romania its status of conservation is least concern as in all the EU countries (VAN SWAAY *et al.* 2014, RÁKOSY *et al. in press*).

Pyrgus alveus (HÜBNER, 1803)

Diagnosis

It has a wingspan of 22-32 mm. The dorsal side of the wings is grayish-brown with small, faded white spots. The ventral side of the posterior wings is yellowish-green, with large discs, joined together and forming stripes (TUZOV 1997). The lower part of the distal end of the antenna is light-reddish-brown (RÁKOSY 2013). It can be easily confused with the safflower skipper (*Pyrgus carthami*) as the two species are often found in similar habitats. *Pyrgus carthami* can usually be

distinguished from *Pyrgus alveus* by its more closely grouped white spots on the forewing and a band of evenly sized pale spots in the postdiscal area of the hindwing. It is advisable to study the genital armature to confirm the accuracy of the diagnosis.

Biology and Ecology

It is a meso-thermophilic species, present in many types of meadows, but preferably in extensive pastures, mountain and subalpine meadows, as well as meadows to the upper boundary of the forest (RÁKOSY 2013). It is a univoltine species and flies from the beginning of June until the end of August. Adults have a fast flight and can be observed on wet soil, where they extract mineral salts (VAN SWAAY *et al.* 2014).

Distribution

P. alveus has a palearctic distribution (KUDRNA *et al.* 2011). It is found from North Africa, Europe, Turkey, Asia Minor, Caucasus Mountains, Southern and Western Siberia, Urals, Central Asia, Mongolia and North China (TOLMAN *et al.* 2001).

In Romania it is found in Banat, Carpathians, Transylvania and Moldova between 200 and 1800 m. (Fig. 19) (RÁKOSY 2013).

Conservation

The IUCN European Red List status of *Pyrgus alveus* is least concern. The Romanian Red List status is also least concern/ near threatened (VAN SWAAY *et al.* 2014, RÁKOSY *et al.* *in press*).

Pyrgus serratulae (RAMBUR, 1840)

Biology and Ecology

This is a relatively distinctive species; the upper side has tiny white marks on the forewings and almost unmarked on the hindwings. The underside is usually mostly olive-green with faded markings. The wingspan is 24–32 mm. It habits many types of meadows, but they prefer those rich in flowers, meso-xerophilic on limestone or sandy-clay soil in the hilly-mountainous area. It is a univoltine species, flying according to the altitude where it is found: in Dobrogea in April-May, in the hilly area from mid-May to the end of June and in the mountain-subalpine area in July-beginning of August. Butterflies have been observed on wet soil and excrements, where they extract mineral salts (RÁKOSY 2013).

Distribution

It has a Eurasian distribution (KUDRNA *et al.* 2011). It is found in Spain, from Central Europe to Asia Minor, Iran, Libyan, South and Central Siberia, Mongolia and North East China (TOLMAN *et al.* 2001, Tuzov 1997).

In Romania the species was reported in Dobrogea, Southern Carpathians and Curvature Carpathians, Transylvania and northern Moldova. It is found between 50 and 400 m (Fig. 20).

Conservation

The IUCN European Red List status of *Pyrgus*

serratulae is least concern. The Romanian Red List status is data deficient (VAN SWAAY *et al.* 2014, RÁKOSY *et al.* *in press*).

Pyrgus carthami (HÜBNER, 1813)

Diagnosis

With a wingspan of 30–34 mm, *P. carthami* is the largest species of *Pyrgus*. It distinguishes itself from other species by the presence of a white-gray “heap” on the edge of the ventral faces of the wings (RÁKOSY 2013). On the dorsal side of the posterior wings there is a series of small white spots in the submarginal region, which in some individuals continue on the previous wings, but are more faded (TOLMAN *et al.* 2001). The lower part of the distal end of the antennae is dark brown. It can be confused with *Pyrgus alveus* as the two species are often found in similar habitats. It is advisable to study the genital armature to confirm the accuracy of the diagnosis.

Biology and Ecology

It habits meadows on a limestone substrate, clay-sandy or loess with nude ground portions and short vegetation, weakly tucked up with many individuals of *Bromus* sp. and *Festuca* sp. It is a univoltine species and flies from mid-May to August. Flight times may vary, depending on microclimate and altitude (RÁKOSY 2013). Adults were observed on *Trifolium pratense*, *Trifolium campestre*, *Leucanthemum vulgare*, *Hieracium pilosella*, *Agrimonia eupatoria*, *Medicago lupulina*, *Anthyllis vulneraria*, *Galega officinalis*, *Linum flavum*, *Solidago virgaurea*.

Distribution

It is a Eurasian species (KUDRNA *et al.* 2011) and it is found from southern Europe to Asia Minor and western Siberia (Tuzov 1997, TOLMAN *et al.* 2001).

In Romania it is found in Transylvania, Carpathians and northern Moldova between 100 and 1500 m (Fig. 21).

Conservation

In Romania its status of conservation is least concern as in all the EU countries (VAN SWAAY *et al.* 2014, RÁKOSY *et al.* *in press*).

Pyrgus andromedae (WALLENGREN, 1853)

Diagnosis

It resembles *P. cacalie*, but can be distinguished by morphological characters or by studying the genital armature to confirm the accuracy of the diagnosis. *P. andromedae* has three white spots in the basal region of the ventral side of the posterior wings (*P. cacalie* has only two, the middle one is missing). Also, the white spot is more or less faded (but always present) in the disc, dorsal area of the posterior wings, which is elongated in this species (DINCĂ *et al.* 2008). It is advisable to study the genital armature for a correct diagnosis.

Biology and Ecology

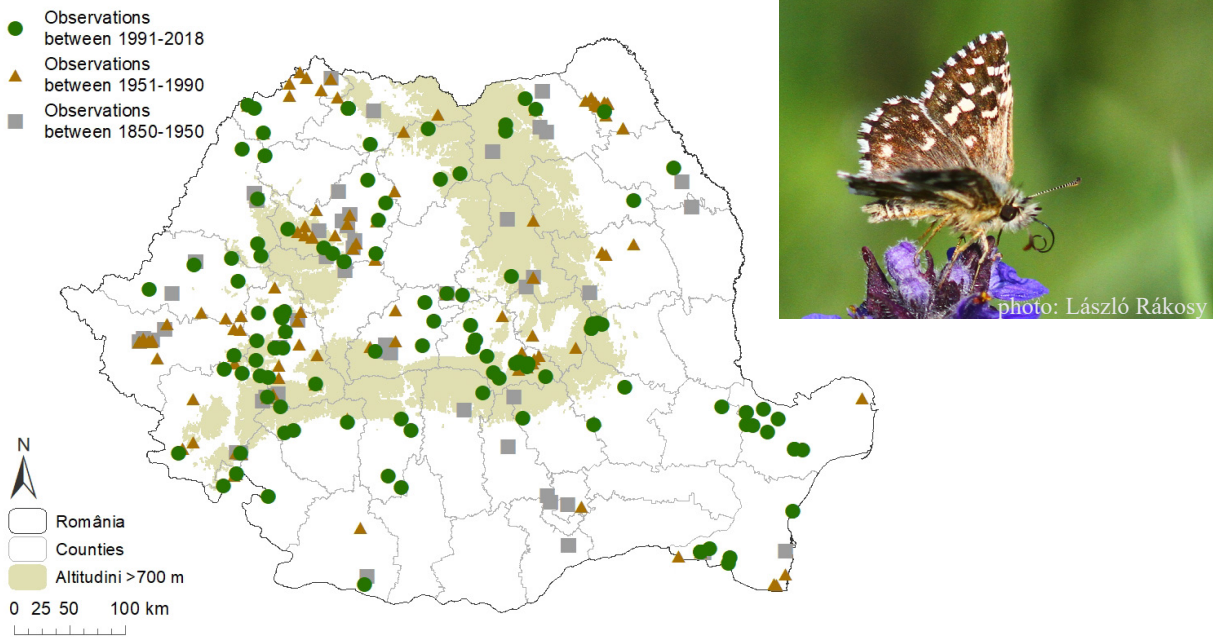


Fig. 17. Distribution map of *Pyrgus malvae* in Romania

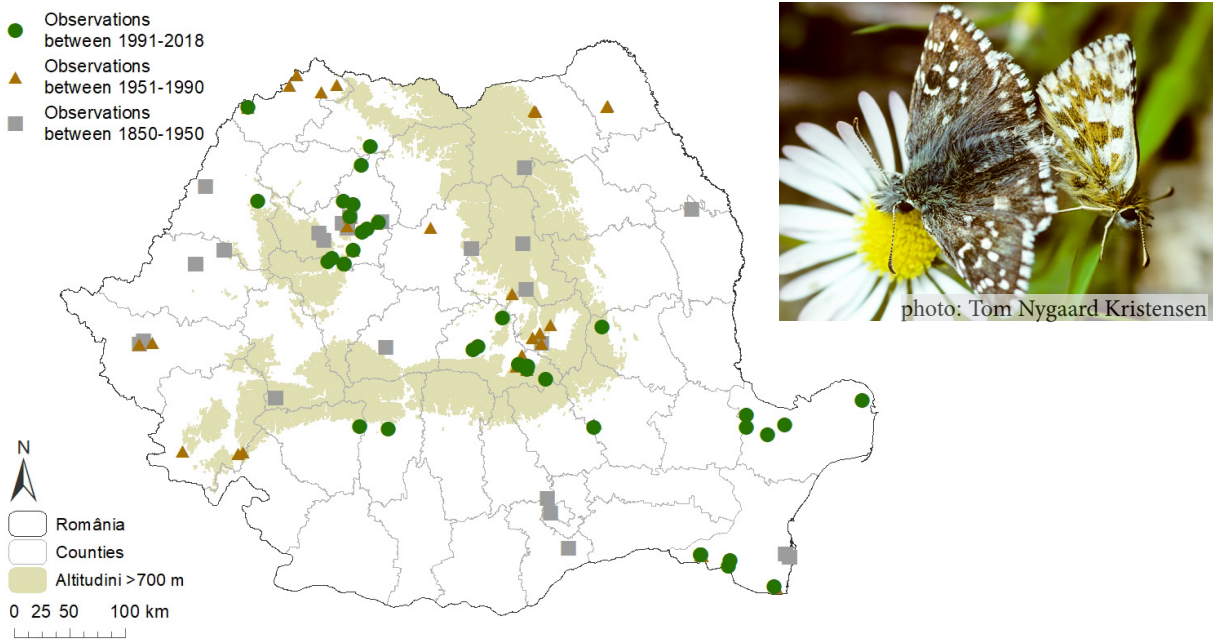


Fig. 18. Distribution map of *Pyrgus armoricanus* in Romania

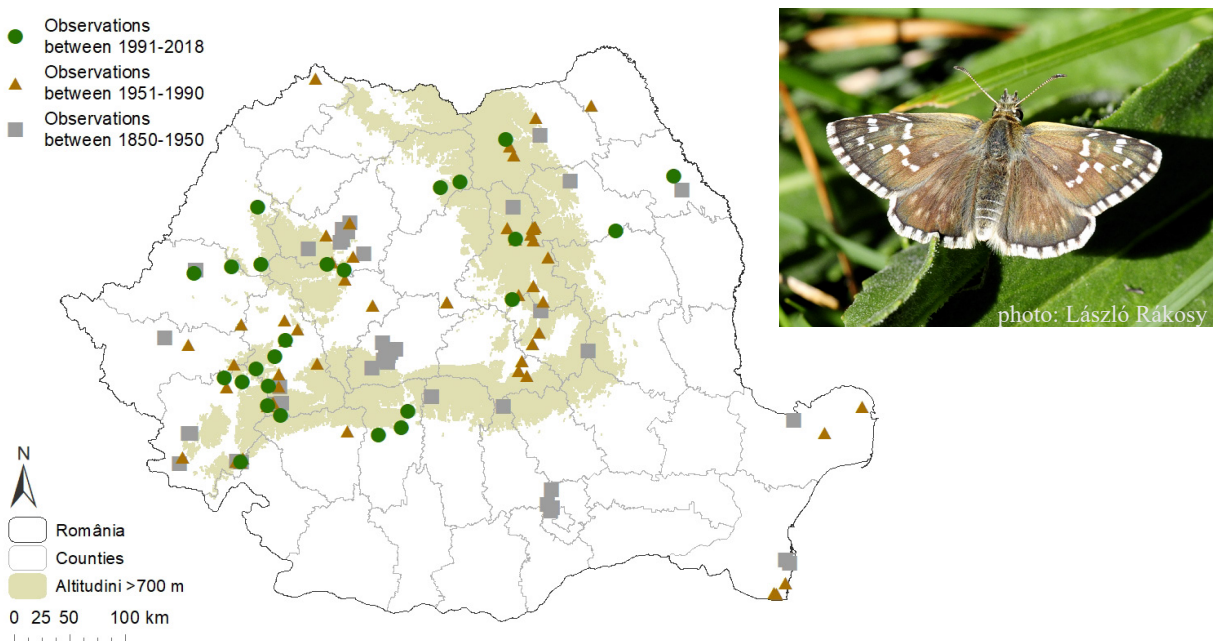


Fig. 19. Distribution map of *Pyrgus alveus* in Romania

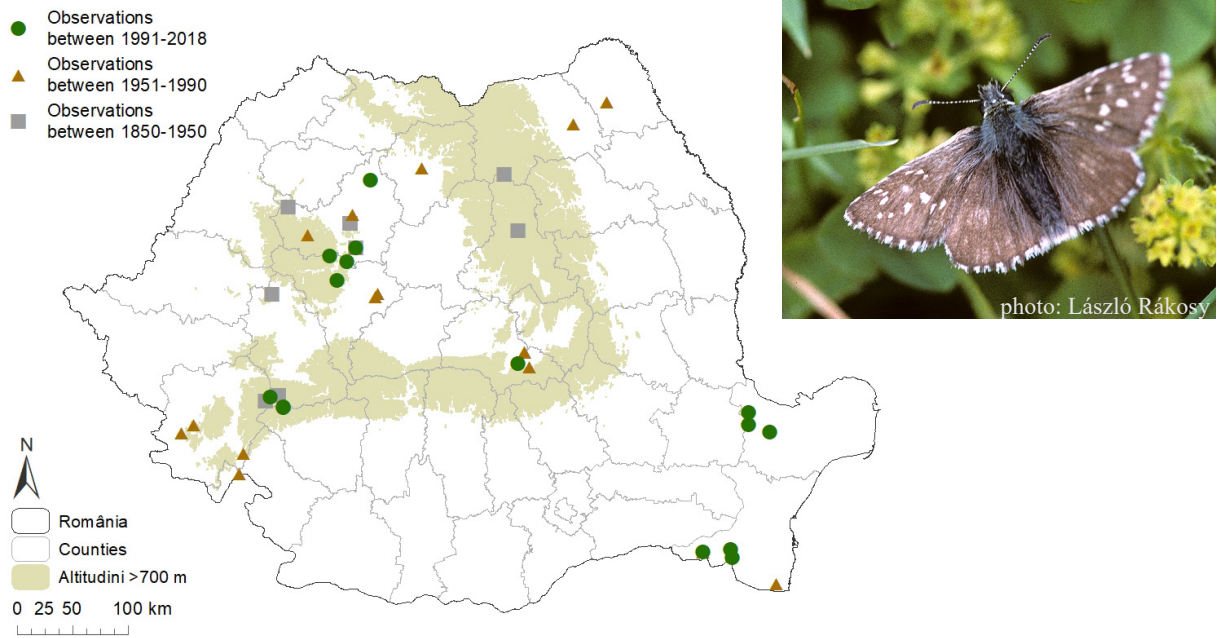


Fig. 20. Distribution map of *Pyrgus serratulae* in Romania

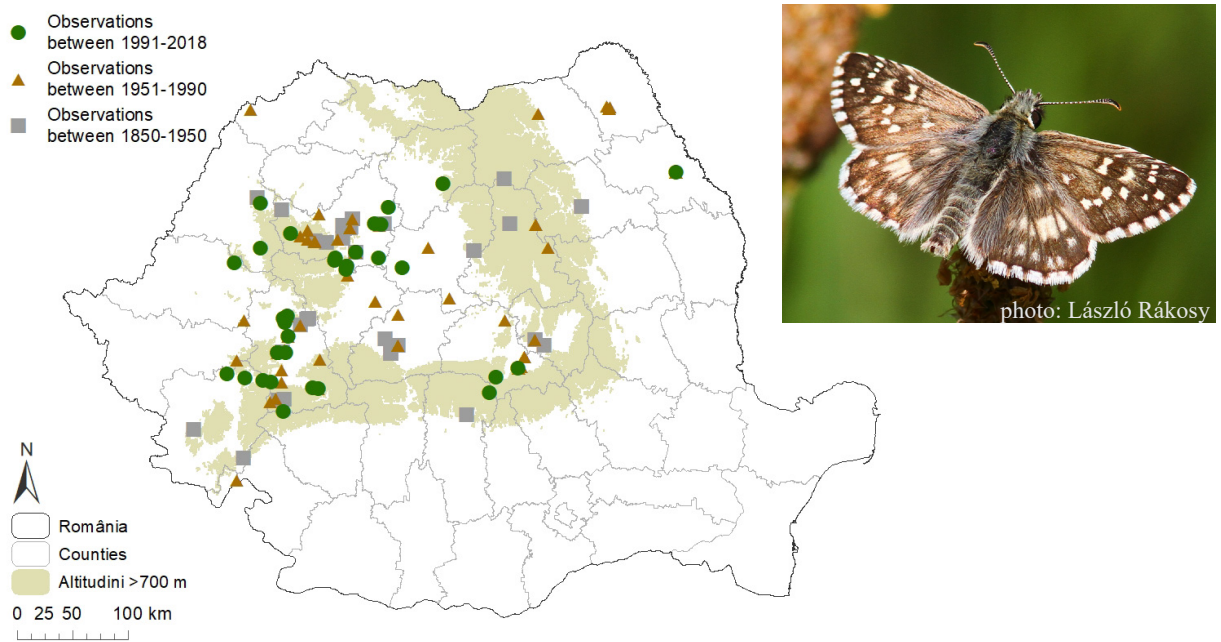


Fig. 21. Distribution map of *Pyrgus carthami* in Romania

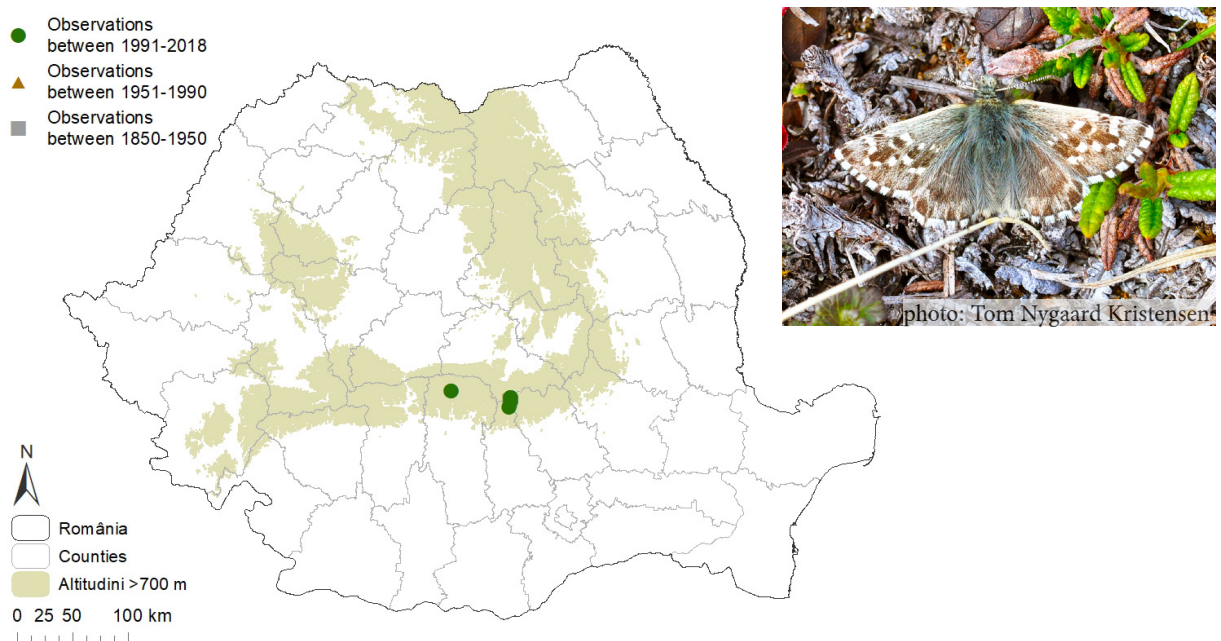


Fig. 22. Distribution map of *Pyrgus andromedae* in Romania

It is found in subalpine and alpine meadows as high as 1500 m to 2400 m. It is a univoltine species, flying from the beginning of July to the end of July (RÁKOSY 2013). In Romania it shares its habitat and flies with *P. cacaliae* (DINCĂ *et al.* 2008).

Distribution

It is a European endemic, Arcto-alpine species (KUDRNA *et al.* 2011). It is located in the Pyrenees, the Alps, the Balkans, the Carpathians, northern Europe on the border between Norway and Sweden, as well as in Lapland. In Switzerland it is found at altitudes between 1000 and 2700 m, and in Spain between 1500 and 2000 m (VAN SWAAY *et al.* 2014).

In Romania it was first seen in 1897 (CZEKELIUS 1897). It seems to be located only in the Southern Carpathians in the Bucegi and Fagaras Mountains (Fig. 22). It occurs at altitudes between 1700 and 2350 m.

Conservation

The IUCN European Red List status of *Pyrgus andromedae* is least concern. In Romania *P. andromedae* is classified as vulnerable, but there is a data deficit on species status in the Carpathian Mountains. In known areas, the butterfly is common and shows stable populations (VAN SWAAY *et al.* 2014, RÁKOSY *et al.* *in press*).

Pyrgus cacaliae (RAMBUR, 1840)

Diagnosis

It is very similar to *P. andromedae*. It has small spots on the back of the front wings. On the ventral side the spots are faded. There is no central basal patch on the dorsal side of the posterior wings - only two spots are present, *P. andromedae* has three spots (TOLMAN *et al.* 2001, DINCĂ *et al.* 2008).

Biology and Ecology

It populates with *P. andromedae* alpine and subalpine wet meadows, on acidic or basic substrate. It is a univoltine species and flies at the same time as *P. andromedae* from July to August (DINCĂ *et al.* 2008, RÁKOSY 2013).

Distribution

It is an endemic species in Europe, found in the Alps, Southern Carpathians, Pyrenees. It is found at altitudes between 1800 and 2800m (TOLMAN *et al.* 2001).

In Romania was first reported in 1906 (CZEKELIUS 1907). According to the data, the butterfly is only found in the Southern Carpathians, in the Bucegi, Piatra Craiului and Fagaras mountains (Fig. 23). *P. cacaliae* is found at altitudes between 1750 and 2450 m.

Conservation

The IUCN European Red List status of *Pyrgus cacaliae* is least concern. The Romanian Red List status is near threatened. Its worst threats are overgrazing and habitat loss (VAN SWAAY *et al.* 2014, RÁKOSY *et al.* *in press*).

Pyrgus sidae (ESPER, 1784)

Biology and Ecology

As habitats it prefers steppe grasslands, limestone or sandy substrate, as well as grasslands and hedgerows. Adults were spotted feeding with nectar on *Achillea*, *Vicia*, *Marrubium*, *Scabiosa* and *Knautia*. Adults have a quick flight and a territorial behavior, banishing any fly-off from their territory (RÁKOSY 2013). It is a univoltine species and flies from mid-May to the end of June.

Distribution

It has a palearctic distribution (KUDRNA *et al.* 2011). It was reported in western Spain, southeastern France, central Italy, Dalmatia, Greece, Macedonia, Albania, Bulgaria, Romania, Ukraine, Turkey, Asia Minor, Northwest Asia, South Ural, Northwest Kazakhstan and Western Tian Shan (TOLMAN *et al.* 2001, VAN SWAAY *et al.* 2010, RÁKOSY 2013). It is found at altitudes between 50 and 1750 m (TOLMAN *et al.* 2001).

In Romania it is found in Dobrogea, the Eastern Carpathians, Transylvania and in the north of Oltenia. It seems to be missing from the south, east, west and north of the country (Fig. 24). It is found at altitudes between 50 and 850 m.

Conservation

The IUCN European Red List status of *Pyrgus sidae* is least concern (VAN SWAAY *et al.* 2014). The species is classified as vulnerable nationally, endangered or near threatened taxon in some areas of Romania (RÁKOSY *et al.* *in press*).

Conclusions

In the fauna of Romania 24 species of Skippers are present. Analyzing the altitude distribution, we have found that most of the HesperIIDae are present on foothills zone (14 species), followed by the lowlands zone with 6 species, montane zone with 2 species, subalpine and alpine zones each with one species (Fig. 1).

In Romania, only *Heteropterus morpheus*, *Muschampia cribrellum*, *Muschampia tessellum* and *Pyrgus sidae* are protected by law (GEO No. 57/2007, Annex 4B). There is no legislation at European level for the protection and conservation of the species in this lepidopteran family. Unfortunately, out of all the species present on the Romanian territory, only *Muschampia cribrellum* approaches the implementation of measures at European level, after the IUCN report from 2010, it was classified as near threatened, drawing attention to the habitat fragmentation and isolation of populations. This species has a total area populated on the European continent of only 42 km² (VAN SWAAY *et al.* 2010).

M. cribrellum and *M. tessellum* meet all the criteria to be included in the list of species in the EU FFH Directive. Maintaining the two species in the EU

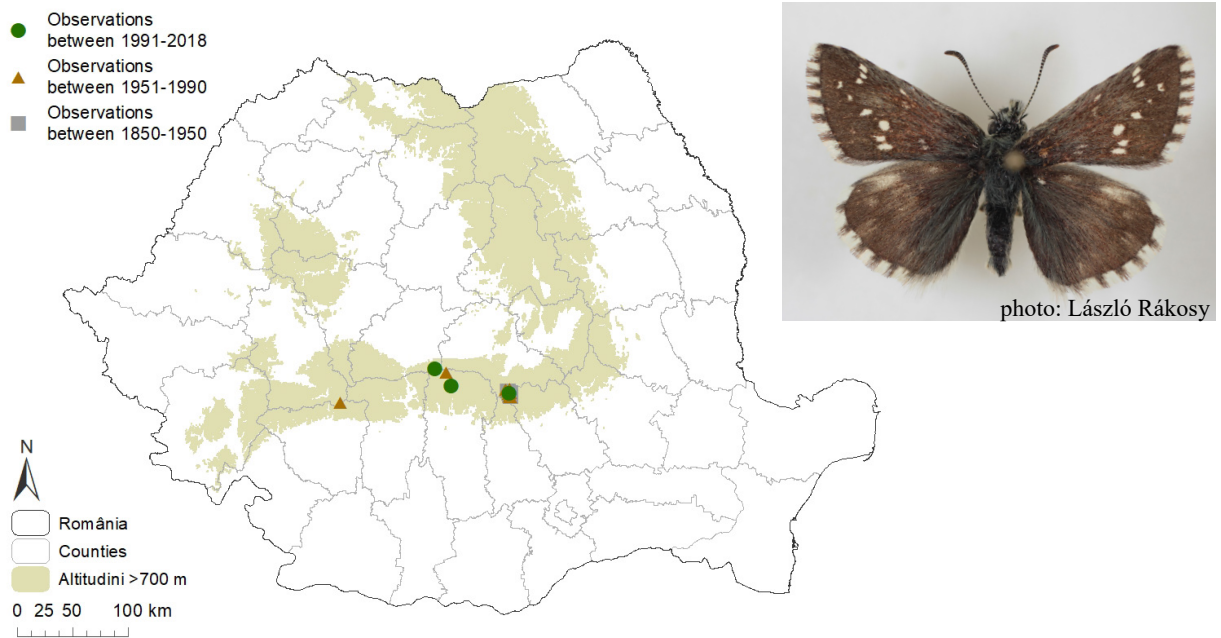


Fig. 23. Distribution map of *Pyrgus cacaliae* in Romania

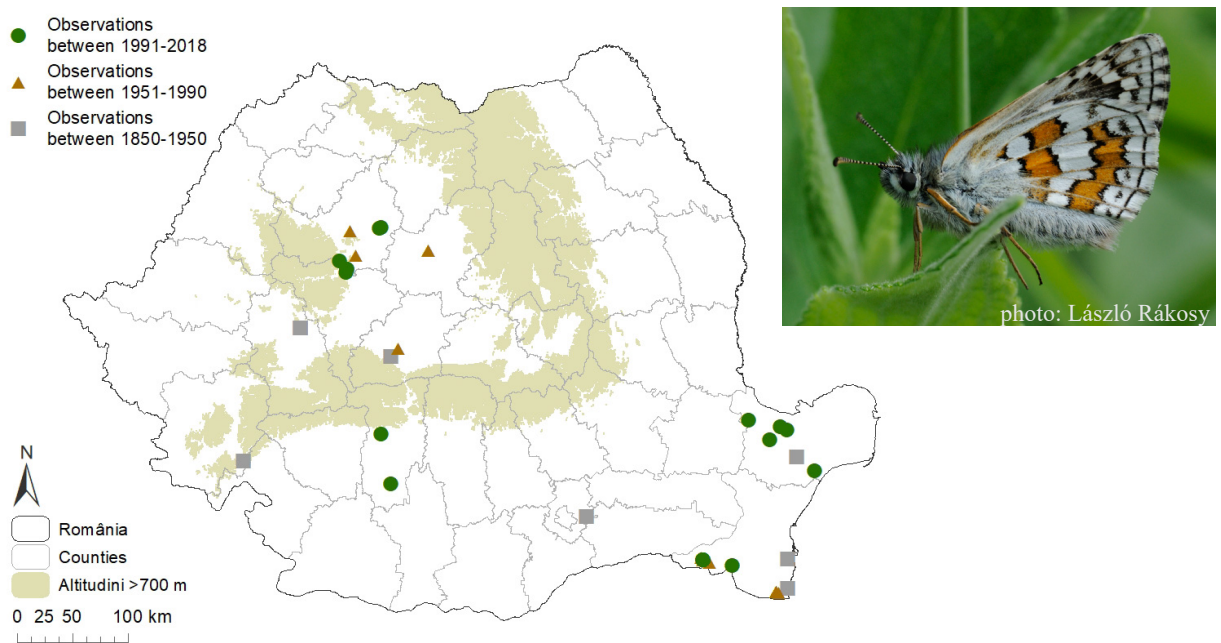


Fig. 24. Distribution map of *Pyrgus sidae* in Romania

depends on the protective and conservation measures that will be implemented in the countries where they are present. Unfortunately, in Romania this has been neglected so far.

Among the impact factors on the populations of HesperIIDae in Romania are: habitat transformation and alteration, urban development, intensification of agriculture, pollution, climate change and habitat fragmentation. Of all the impact factors, intensive grazing, with large flocks throughout the year is most likely to endanger the populations of HesperIIDae, because many of these species are dependent on the existence and quality of pastures. In order to protect and conserve the populations of HesperIIDae in Romania, it is important to raise awareness about this lepidopteran family and include them in the conservation measures.

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Cristina COSTACHE
Department of Taxonomy and Ecology
Babeş-Bolyai University, Clinicilor 5-7
Cluj-Napoca, RO-400006, Romania
E-mail: costachecristina59@yahoo.com

Maria-Milena FILIP
Department of Taxonomy and Ecology
Babeş-Bolyai University, Clinicilor 5-7
Cluj-Napoca, RO-400006, Romania
E-mail: filipmariamilena@gmail.com

Andrei CRIȘAN
Department of Taxonomy and Ecology
Babeş-Bolyai University, Clinicilor 5-7
Cluj-Napoca, RO-400006, Romania
E-mail: andrei.crel@gmail.com

László RÁKOSY
Department of Taxonomy and Ecology
Babeş-Bolyai University, Clinicilor 5-7
Cluj-Napoca, RO-400006, Romania
E-mail: laszlo.rakosy@ubbcluj.ro

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Appendix 1.

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