

Recommendations for the conservation of endangered lycosid spiders (Araneae, Lycosidae)

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Summary

Of the 44 species of Lycosidae occurring in our country, distribution maps were made up. About half of the species can be considered to be endangered. We have tried to determine the habitat requirements of these species. They are usually bound to special, open habitat types, varying from very wet to very dry. In this contribution, some characteristics are discussed that make these species very useful as ecological indicators. Recommendations are given for the preservation of these species and their habitats.

Key-words : Lycosidae, distribution, habitat requirements, nature conservation.

Samenvatting

Van de 44 soorten Lycosidae die in ons land voorkomen werden verspreidingskaarten opgemaakt. Ongeveer de helft van de soorten kan als bedreigd worden beschouwd. Daarnaast werd gepoogd een idee te krijgen van de habitateisen die elke soort stelt. De soorten zijn meestal gebonden aan speciale, open habitat types, gaande van zeer nat naar zeer droog. In deze bijdrage worden een aantal karakteristieken aangehaald die deze soorten geschikt maken om als ecologische indicatoren te gebruiken. Tevens worden aanwijzingen gegeven in verband met de bescherming van deze soorten en hun habitaten.

Trefwoorden : Lycosidae, verspreiding, habitat preferentie, natuurbehoud.

Introduction

Of the more than 650 spider species known from our country, 44 belong to the family Lycosidae and are called wolf spiders. The species of this family are all medium to large sized spiders which do not build a web to catch their prey (only *Aulonia albimana* does, see Job, 1974), but actively hunt for it on the ground surface or on low vegetation.

Lycosid spiders can be easily distinguished by the position of the eight eyes. The anterior eyes are rather small. The posterior median eyes are enlarged and very conspicuous and the posterior lateral eyes are situated on the side of the carapace and are medium sized. All legs possess three tarsal claws.

Special is also their breeding behaviour. The egg cocoon is attached to the spinnerets and carried along until the spiderlings hatch. The offspring climbs on the abdomen of the female and is carried along by the female for at least another week.

Recently, we effectuated a study dealing with the distribution, habitat preference and life cycle of the Belgian Lycosidae. By doing so, we realized that this fundamental knowledge could be applied for nature conservation purposes because the species occurring in our country have very specific demands for what concerns the characteristics of habitats in which they can thrive. This and other properties mentioned hereafter make them good ecological indicators for the whole gradient of open habitats from very wet grasslands to very dry heathland and dunes. Recommendations for the preservation of these species are thus not only in benefit of the species themselves, but are also a tool for preservation of the complete range of variation of the animal and plant communities of these open habitats.

Material and methods

Very different sources were used for collecting distribution data. An important base was of course the large collection of the 'Koninklijk Instituut voor Natuurwetenschappen' at Brussels and the collection of the State University of Ghent. Besides this, different private collections were checked and a lot of recently collected material was identified. Distribution maps were made up, based on the Universal Transverse Mercator projection (in the frame of the European Invertebrate Survey) using 10 x 10 km squares.

For assessing habitat preferences of the different species, we analysed the data of more than eighty year cycles of pitfall trapping scattered all over the country. We will go into much more detail concerning the material and methods in the catalogue of the Belgian Lycosidae which is in preparation.

Results and discussion

In Belgium, 44 species of Lycosidae occur divided over nine genera: *Alopecosa* (8 species), *Arctosa* (4 species), *Aulonia* (1 species), *Hygrolycosa* (1 species), *Pardosa* (16 species), *Pirata* (7 species), *Tricca* (1 species),

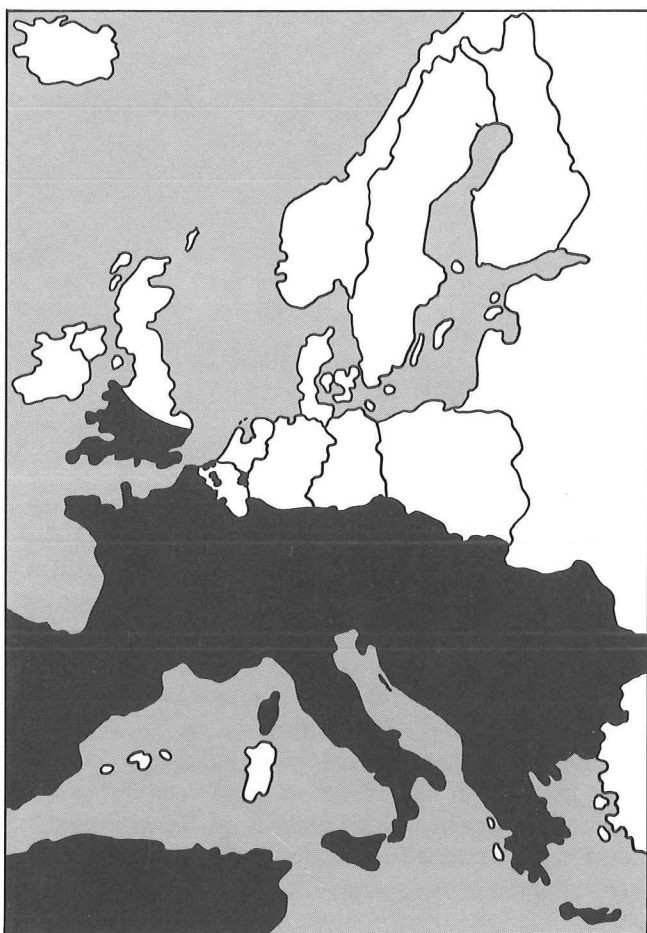


Figure 1 : European distribution of *Pardosa proxima* (C.L. Koch, 1847).

Trochosa (4 species) and *Xerolycosa* (2 species).

When analyzing the collected data, it became clear that there are some practical advantages making lycosid spiders particularly suited for use in nature conservation:

1. They are easy to sample, moreover, they are easy to sample in large numbers. This can be done by pitfall trapping, but also by simply catching them by hand as they are most of the time very conspicuous. Because of the detailed knowledge of the seasonal activity distribution patterns of the species, it is possible to concentrate pitfall trapping during these short periods of the year, reducing the time investment considerably. The use of pitfall trapping not only enables us to inspect for the presence of a particular species, but also gives a measure of its abundance.

2. A second practical advantage is the size of the animals. They are not very small and can be identified rather easy with the help of recent taxonomic revisions which became available during the last decades (e.g. Buchar, 1959; Engelhardt, 1964; Holm & Kronstedt, 1970; Kronstedt, 1980; Lugetti & Tongiorgi, 1965; Tongiorgi, 1966a, 1966b; Wunderlich, 1984). It is still a

sort of drawback that these revisions are scattered over different publications. An identification key will therefore be included in the publication we are preparing dealing with the distribution of these species in our country.

3. Thirdly, their distribution and occurrence in Belgium is rather well known. This is of course an indispensable base. Of the 44 species occurring in Belgium, distribution maps were made up. These distributions are important but are only a starting point.

To be able to formulate recommendations for the preservation of the particular species, it is however necessary to know which ecological factors are responsible for the observed distribution patterns. Species at the limit of their zoogeographical range can thus not be used within this context. An example of a lycosid spider for which the distribution can be explained in terms of zoogeography is *Pardosa proxima*, a southern European species, reaching the northern borderline of its distribution in our country, (Fig. 1).

For some species, the ecological background of their distribution pattern is very obvious. They are bound to very particular habitat types. *Pardosa purbeckensis* occurs in our country only in salt marshes (there is one very doubtful inland record) (Fig. 2) whereas *Pirata knorri* is completely restricted to stony river banks along running water, a habitat exclusively found in the Ardennes, (Fig. 2). Recommendations for these species are easy : you simply make sure that these particular habitats are preserved or that others are created.

The majority of lycosid species however have habitat requirements which differ much more subtly from each other. They offer a very useful tool to compare the ecological quality of grasslands, heathland and dune habitats. This makes them for instance very interesting in judging the effects of management measures in these habitat types. We will illustrate this with some examples (Fig. 3, 4, 5).

The four species of *Trochosa* occurring in our country inhabit a broad range of grassland types. *Trochosa terricola* is the most common species of the genus. It occurs in a wide variety of situations if it is not too dry nor too wet, varying from woodland clearings to certain dune habitats. A bit less common is *Trochosa ruricola*. It prefers a more humid environment to live in. Restricted to wet grassland with at most only some marginal agricultural usage is *Trochosa spinipalpis*. Although the records of this species are scattered over the country, it is in the Flemish part of Belgium almost exclusively found in nature reserves. On the other end of the spectrum lies *Trochosa robusta*. This species occurs in dry grasslands, especially chalk grasslands. Another example of a sequence of species indicating a gradient in quality of habitats is illustrated on the next sheet with the species of the *Pardosa pullata*-group. *Pardosa pullata* is the common species. Its habitat varies from wet heathlands to the grassy edges of

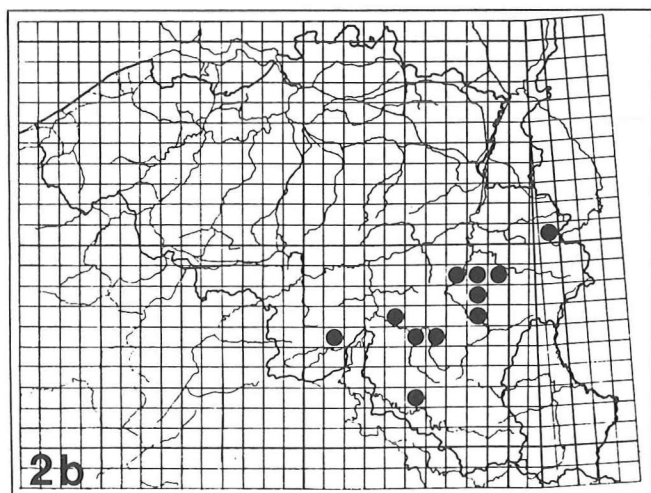
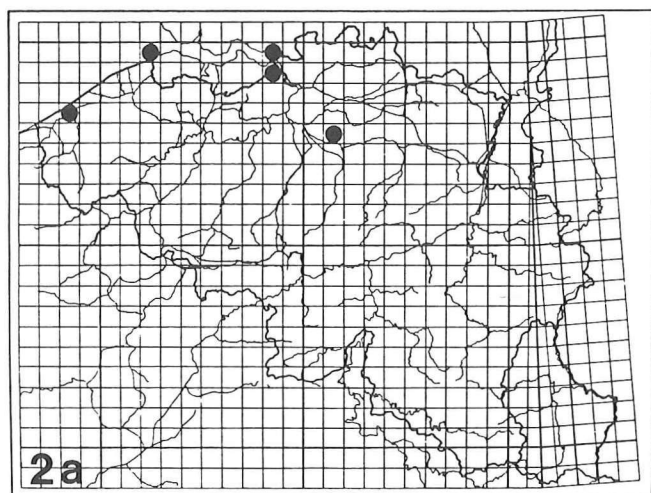


Figure 2 : Recent distribution data in Belgium of (2a) *Pardosa purbeckensis* F.O. P.-Cambridge, 1895 and (2b) *Pirata knorri* (Scopoli, 1763).

intensively managed crop fields. *Pardosa prativaga* has a more restricted habitat choice. It is only found in far less productive grasslands. *Pardosa sphagnicola*, finally, is a very rare species bound to very wet heathland in the vicinity of *Sphagnum* bogs.

The gradient of wet habitats is even more finely subdivided by considering the species of the genus *Pirata*. But we will not discuss this genus here in more detail.

The dry side of the spectrum is covered by the species of the genus *Alopecosa*. *Alopecosa pulverulenta* is very common, occurring even in all kinds of ruderal situations. *Alopecosa cuneata* and *Alopecosa accentuata* occur in drier situations with shorter grass. *Alopecosa fabrilis* is almost exclusively found in open, sandy habitats with only patches of vegetation. Finally, *Alopecosa trabalis* is quite comparable to *Trochosa robusta* as it also prefers very dry chalk grasslands.

The above discussed species are ecological indicators in the real sense of the word. The factors that influence their presence and abundance cannot be described in

detail. The only way to assess if their habitat requirements are fulfilled is the observation of the presence of these species. The strategy to be followed to obtain the rarer species in a given habitat can be described in general terms. For instance : in order to get *Trochosa spinipalpis* in a grassland in which only *Trochosa terricola* occurs one should adopt a management that brings down primary production in the first place (by haying for instance) and secondly increases the ground water level. The water should be of good quality, with a low nutrient status. Inspecting for the appearance of *Trochosa spinipalpis* would reveal when the desired environmental conditions are achieved.

It is however clear that the appearance of the "better" species may be delayed by the absence of source habitats in the vicinity of the managed habitat. This island biogeographical constraint to the dispersal is to our opinion not so pronounced here as for plants. The reasoning can also be turned the other way around : the absence of good landscape ecological corridors is reflected in the unexpected absence of certain species.

Conclusion

We can conclude that Lycosidae can be used successfully as ecological indicators for the quality of a broad range of open habitats. Monitoring the effect of management of these habitats by means of these lycosid spiders is therefore highly recommended.

Acknowledgement

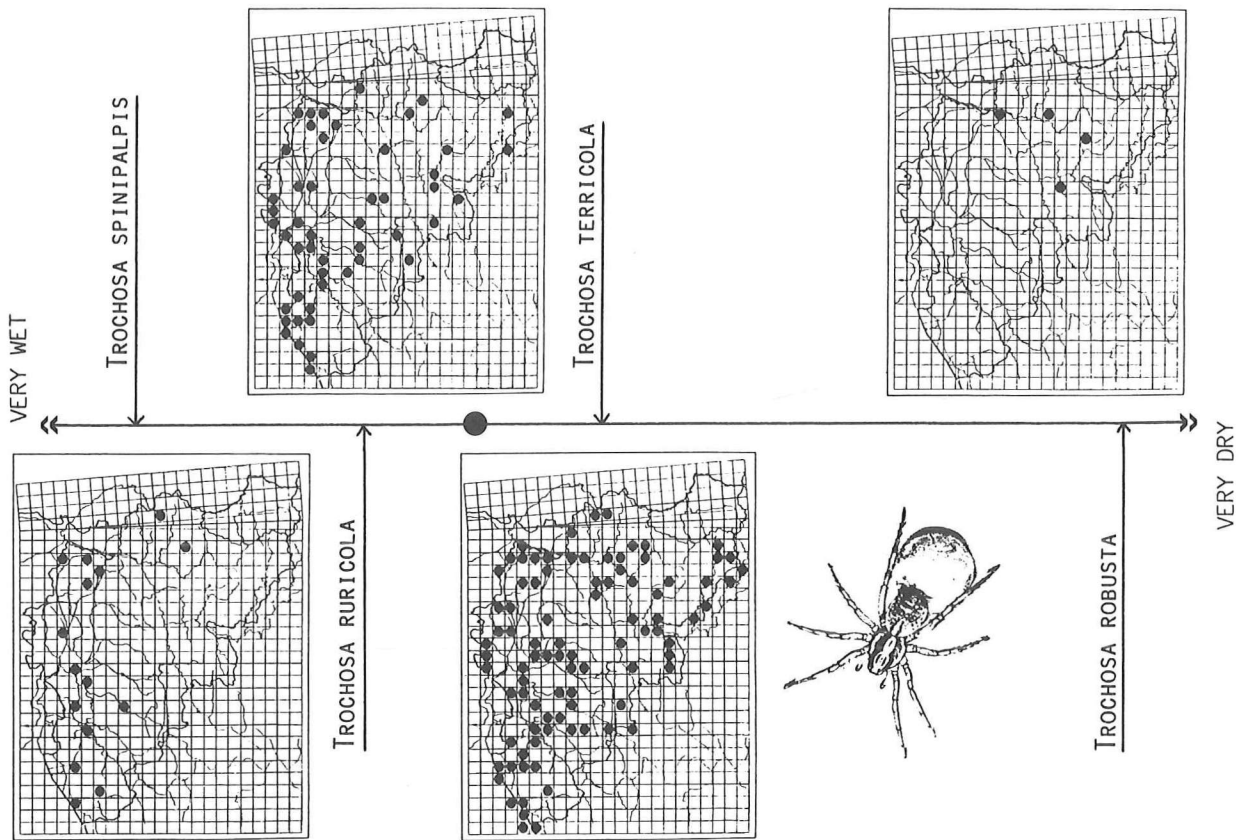
We thank Dr. K. Roche for revising the English text.

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TROCHOSA

3



PARDOSA

4

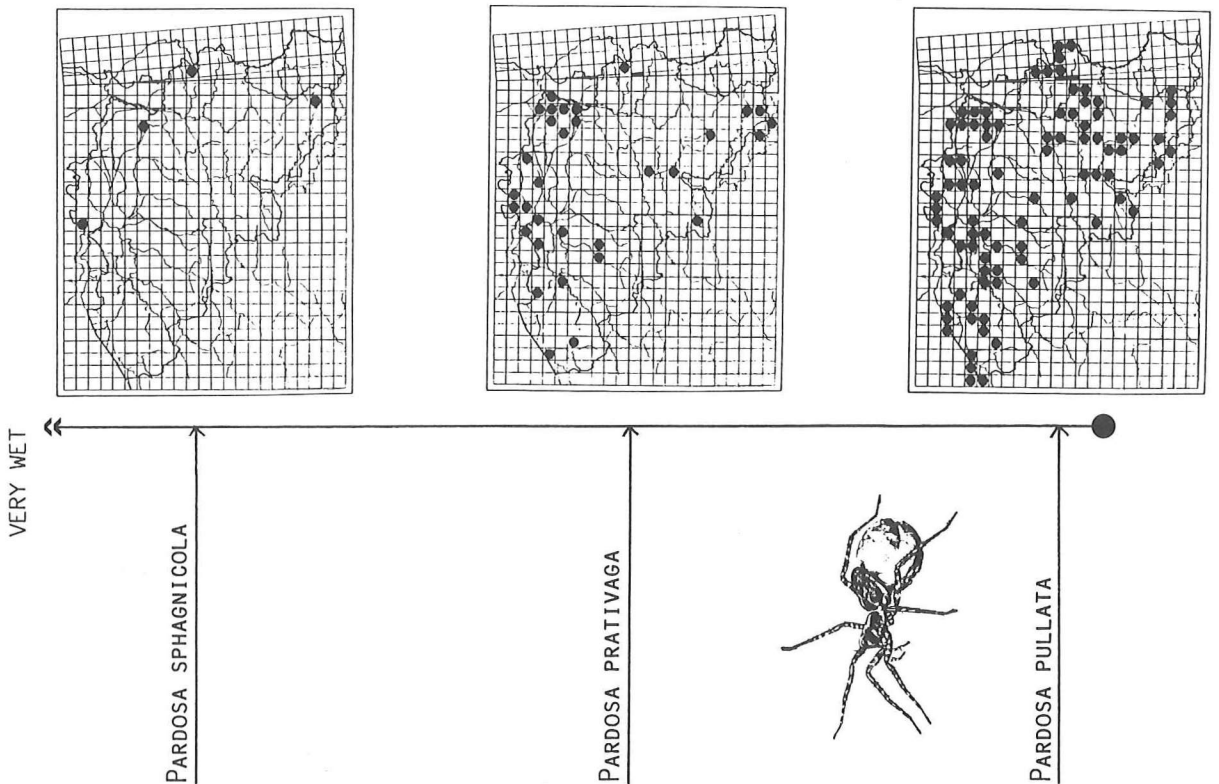


Figure 3 : Distribution of the four Belgian species of the genus Trochosa in relation to their requirements for humidity of the habitat.

Figure 4 : Distribution of the Belgian species of the Pardosa pullata group in relation to their requirements for humidity of the habitat (covering the wet side of the spectrum).

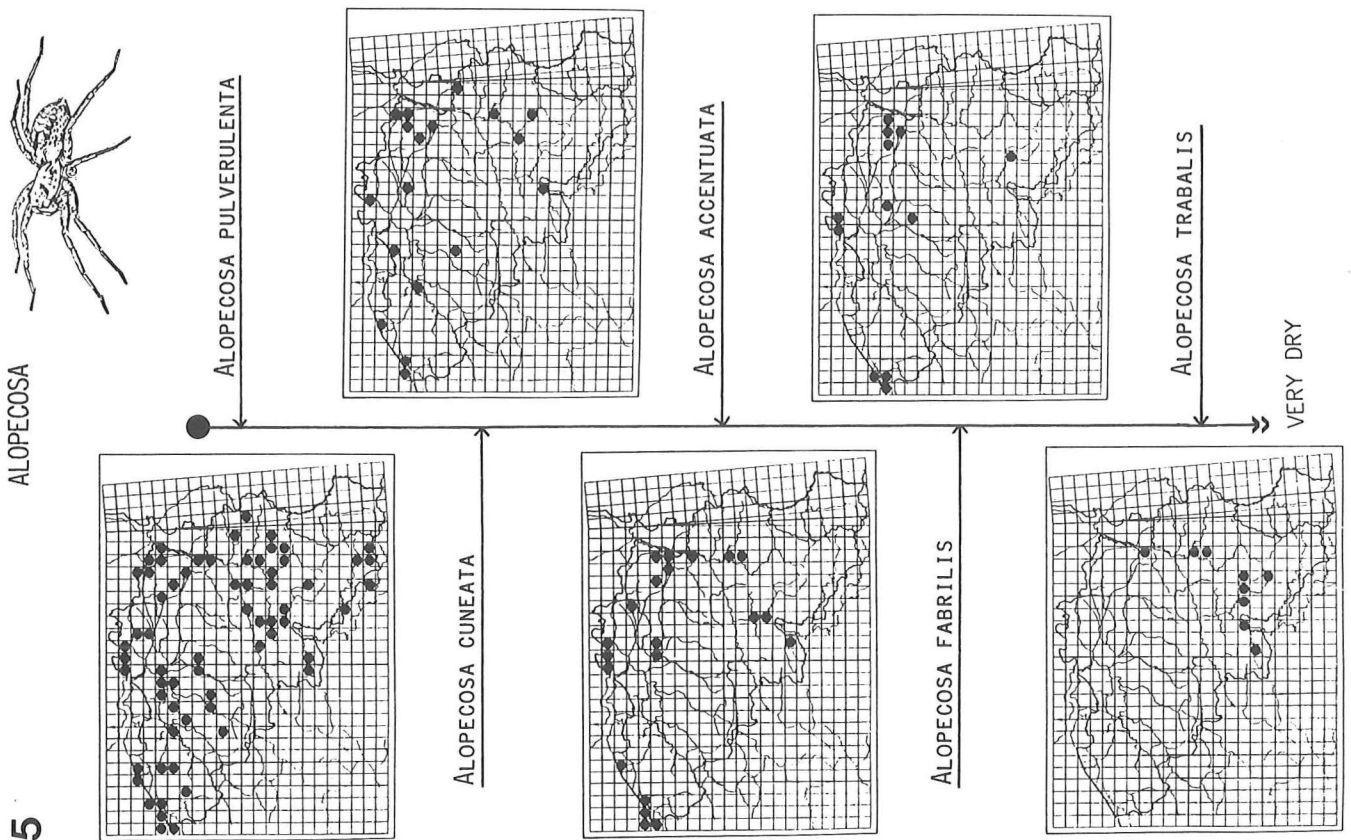


Figure 5 : Distribution of some Belgian representatives of the genus *Alopecosa* in relation to their requirements for humidity of the habitat (covering the dry side of the spectrum).

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