Colonization of Agricultural Fields by Spiders (Arachnida: Araneae)

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Introduction Spiders are common in agroecosystems , making up 20 to 80% of the predatory fauna (Ferguson et al . , 1984 , etc .) . In addition to the area covered by the crops , each agroecosystem includes field margins (narrow grassy strips) bordering the field . It has been demonstrated that spider species diversity and richness is higher in the sown area when the field margins are well-developed (Alderweireldt , 1989 ; *etc* .) . The main question to be answered in this study is how penetrable is the field edge for spiders inhabiting the field margin ?

Materials and method Spider assemblage was studied in vetch-oat (VA) and winter wheat (WW) fields of two distant regions of European part of Russia : Moscow Area (M) (55°59′N , 37°24′E) and Krasnodar Province (K) (45°03′N , 39°18′E) . The agricultural fields are of 10-15 ha in M and up to 100 ha in K . Sampling was performed with entomological sweeping and pitfall traps for six crop seasons (M-1994-96 , 1998-99 , K-1999-2000) . Sweeping was used from May to Aug . (M) and from April to June (K) every 6 , 8 or 10 days depending on year . Pitfall trapping was done every ten days from April to Oct . (M) and from Mar . to June (K) . Sampling plots were set in the cropland , viz . in field edges (FE) (10 m distance from the field border) and in the field centre (FC) (150 m distance in M , 200 and 400 m in K) , as well as in grassy field margins (FM) at 3-5 m distance from the field , and bordering strips of adjacent habitats .

Results and discussion The dominant spider species in the agroecosystems studied had four patterns of spatial distribution . (1) Spiders preferring the croplands : hortobionts *Microlinyphia pusilla* , *Misumena vatia* (VA) , *Hypsosinga pygmaea* , *Xysticus kochi* (WW) ; herpetobionts *Oedothorax apicatus* , *Pardosa agrestis* , *P . palustris* , *Pachygnatha degeeri* , *Araeoncus humilis* , *Erigone dentipalpis* (WW) . (2) Spiders having no clear preference (*i .e* . abundant throughout an agroecosystem) : hortobionts *Tetragnatha extensa* (VA , WW) , *Tibellus oblongus* (WW) ; herpetobiont *Trochosa robusta* (WW) . (3) Spiders preferring FM (*i .e* . were less abundant toward FC) : hortobionts *Microlinyphia pusilla* , *Agyneta rurestris* , *Dictyna arundinacea* , *Misumenops tricuspidatus* , *Xysticus ulmi* (WW) ; herpetobiont *Pardosa pullata* (WW) . (4) Spiders avoiding croplands (*i .e* . abundant only in FM and practically absent from FC) : 11 species .

Evidently , not all spiders that are abundant in FM penetrate into the croplands beyond their edges . Herpetobiont spiders inhabiting crops are usually represented by the agrobionts (*i .e* . those with a clear preference for agrocoenoses) , which are widespread in the temperate zone of Europe . Amongst hortobiont spiders there are no clear agrobionts , but some of them do tend to occur in European agrocoenoses . FM are inhabited both by widespread and by local species , but the composition of dominant species is governed both by adjacent natural habitats and by the flora of the margins itself . The dominant spider species in FM often prevail in FE , but a few of them are also dominant in FC .

Conclusions Spiders rapidly colonize winter crops ; most spiders that occur in the croplands invade the entire field at the beginning of the vegetation season . The spider colonization of the herbage of spring crops occurred later than in the winter crops with occupation the entire field towards the middle/end of the vegetation season . The changing conditions during the growing and ripening of a crop can favour either colonization or avoidance of the cropland by spiders . The species , for which the ecological conditions are unsuitable , do not penetrate the cropland further than its edges , regardless of their abundance in FM . In this respect , a field zone of less than 100 m wide (from the border into the cropland) can be considered a barrier" . Species penetrating beyond it are capable of colonizing the entire field regardless of its size .

References

Alderweireldt , M . , 1989 . An ecological analysis of the spider fauna (Araneae) occurring in maize fields , italian ryegrass fields and their edge zones , by means of different multivariate techniques . *Agr . Ecosyst . Environ* . 27 (1/4) : 293-306 .

Ferguson , H J . , McPherson , R .M . , Alien , W .A . , 1984 . Ground-and foliage-dwelling spiders in four soybean cropping systems . *Environ . Entomol* . 13 : 975-980 .