



Conference Abstract

Heathland restoration in the Netherlands

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Abstract

Lowland heathlands dominated by *Calluna vulgaris* are a characteristic ecosystem of the sandy soils of Northwestern Europe. Many of these heathlands have been converted to agricultural lands in the 20th century, but because increasing recognition of their nature conservation value has led to an increase in restoration efforts. Since about 2005, several experiments were carried out in a number of former agricultural areas in the Netherlands with the aim of accelerating the succession in vegetation and surface-dwelling fauna towards heathland. We discuss two projects in which the monitoring of the beetle fauna using pitfall traps was carried out.

In the new reserve “Reijerscamp”, situated in the Central Netherlands, a 10-year monitoring project was carried out in an abandoned sandy field area of ca 200 ha from 2006-2015. The area consisted of a former grain field and a grass seed nursery, with small wooded areas here and there and the aim is to enlarge the area of dry heathland. In 2006, at four 5-10 ha locations, a few hundred meters apart, the nutrient-rich topsoil layer was removed, and the Pleistocene sand exposed. On a part of each of these sites, heather cuttings were deposited to accelerate the formation of dry heathland. The study consisted of five sampling years spread over the entire study period. In each sampling year, 15-25 series of 5 pitfalls were used to sample the reserve during the period April – October, on the untreated, former agricultural parts and on the four parts with removed top soil, both on the bare sand and on the parts with heather deposition. The results for ground beetles, did not support the hypothesis in all respects. From the results, it became clear that creating environmental heterogeneity, generally contributes to the ground beetle diversity in the

reserve. However, the period of ten years was too short to show a clear indication that the faunal succession is moving towards a heathland fauna. The first years showed an interesting fauna with a lot of stenotopic, rare and unexpected species and the local diversity was very high. Halfway through the investigation period, the number of species as well as the numbers of individuals declined. After ten years, in general the character of the fauna was significantly more eurytopic and many of the rare species occurring in the first years vanished. On the four sites with removed topsoil, the carabid fauna differed significantly from the former agricultural land, but there was only a minor difference in the fauna of the parts with only bare sand and those with deposit of heath cuttings, although a clear heathland vegetation was visible in the parts with deposits. Because the area is surrounded by agricultural land and a large forested area, there is hardly direct connection to heathland that can serve as a source for immigration of characteristic heathland species with low dispersal power.. The succession to a typical heathland fauna in this reserve will therefore probably take probably several decades.

Immediately adjacent to the National park "Dwingelderveld" (in the north of the Netherlands) the "Noorderveld", consisting of 200 ha of arable field was acquired for nature restoration. Also here, the aim was to convert this area into heathland by removing the nutrient-rich topsoil layer in 2012-2013, to a depth of more than 60 cm, thus creating a seedless sterile substrate, poor in nutrients. After the topsoil removal, a full factorial experiment of pH manipulation and biotic additions at wet and dry sites was set up to accelerate the process of heathland restoration. Each of 27 plots (9 x 9 meters), received either a liming treatment, acidification or neither, in combination with either heathland sods, heath cuttings, or neither, totaling 9 treatment combinations. From 2013 till 2018 the carabid fauna was monitored frequently by pitfall catches in the plot's centers. In the first years the highest diversity was observed in the plots with lime and sod cuttings and also the most characteristic heathland ground beetle species were found at these plots. Later on, these differences became less significant, which may be due to the relatively small size of the plots, which hardly can be regarded independent of each other. Conclusion is still that adding lime and sods is the best way for heathland restoration, but the differences with the control treatment were small.

The striking result of the present comparison is that the Noorderveld was rather quickly inhabited by characteristic heathland species. This may be due to the fact that latter is directly connected to the vast heathland complex of the national park Dwingelderveld, in contrast to the Reijerscamp, which is isolated from the closest heathlands by a railroad, a highway, large forests and a highly agricultural landscape. connectivity therefore seems to be a crucial condition for characteristic species to colonize new territory, especially for species with low dispersal powers.

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