



## Introduction

Fire is a part of natural disturbances in hemiboreal forests and has profound influence on vegetation succession and biodiversity. Habitat recovers after fire disturbance differs from that of any other severe disturbance. The fire significantly affects the dynamics of forest development by changing soil properties, limiting fire-sensitive species and promoting the spread of pyrophilic species. Also, fire disturbances can change the pattern of competition between stand and ground vegetation, resulting in changes in vegetation structure.

Mires is an important part of the forest ecosystem.

## Research Aim

To characterize the regeneration and succession of ground vegetation after the fire over medium term (25 years).

Most of post-fire studies has focused on tree recovery, but studies about vegetation development after fire data were collected shortly after a fire, especially researches about different biotopes like swamp and bogs are lacking both short and long term.

## Materials and Methods

Sample plots were established in Slitere Reserve in north-western Latvia on areas affected by large fire in 1992. Data were collected in 1993, 2002 (by I. Rēriha) and 2017 (LSFRI "Silava") in five forest quarters, where permanent points located in such a number as to be as representative as possible of the whole mire area and the most characteristic habitats. Four 50 x 50 cm sample plots located at each point (each plot oriented to N, S, E, W). Vegetation plots located in the five habitats.

All analyses performed in the statistical program R 3.4.1 using Detrended Correspondence Analysis (DCA), the analysis of similarities (ANOSIM).

## Results

The statistical comparison of the ground cover vegetation between the selected years (1993, 2002 and 2017) showed significant ( $p$ -value  $<0.001$ ) differences amongst all years. This shows that the vegetation has changed over the last 25 years and the current vegetation in the last year of the survey is different. The first two DCA ordination axis were significant ( $p$ -values  $<0.01$ ) and showed that the vegetation of the analysed biotopes of years was different (Fig. 1). These results indicate a continuous change in the composition of the plant species, where new species have arrived in each period. The gradient captured by the second axis (DCA2) might be related to the moisture of the stand, as suggested by the scores of stand and moss species, which indicates the developing wetter and stable growth conditions.

Sphagnum species also showed stability of regeneration ten years after fire disturbance. The percentage cover of sphagnum moss species in the 1993 year was 4.6%, but between the 2002 year and 2017 year, sphagnum mosses have a stable percentage cover: 52% and 58%, respectively. As well as in the biotopes, where in 1993-year heather was a minimal percentage cover (~ 2%) showed high cover in 2002 (~ 40%) maintaining similar cover in 2017 as well. These results showed the opposite result with other research about the fire disturbance, which says that five years after the fire, the stand must change from the dominance of the heather to the dominance of cowberries (*Vaccinium vitis-idaea*) and bilberries (*Vaccinium myrtillus*). What does not happen in our study, where in all biotopes, cowberries and bilberries almost disappeared, which is in line with the fact that the limiting factor for these shrubs is fire. As well as, looking at each habitat separately in the DCA analysis, it can also see that the species composition varies from year to year (Fig. 2; as an example, a high bog is inserted), where analysis showed the difference between the species in the studied years.

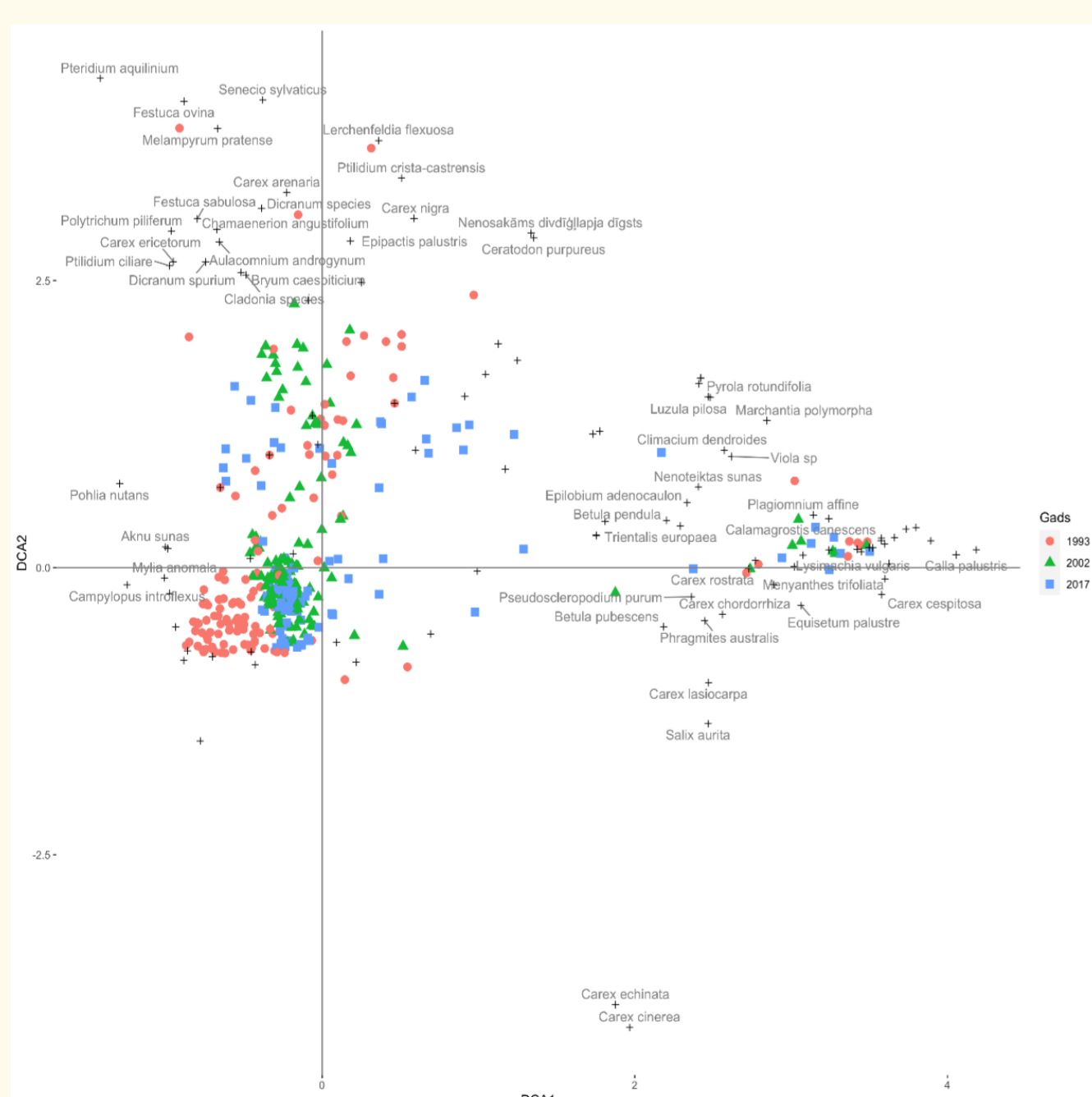


Figure 1. The detrended correspondence analysis ordination of the ground cover vegetation in the all studied biotopes by years.

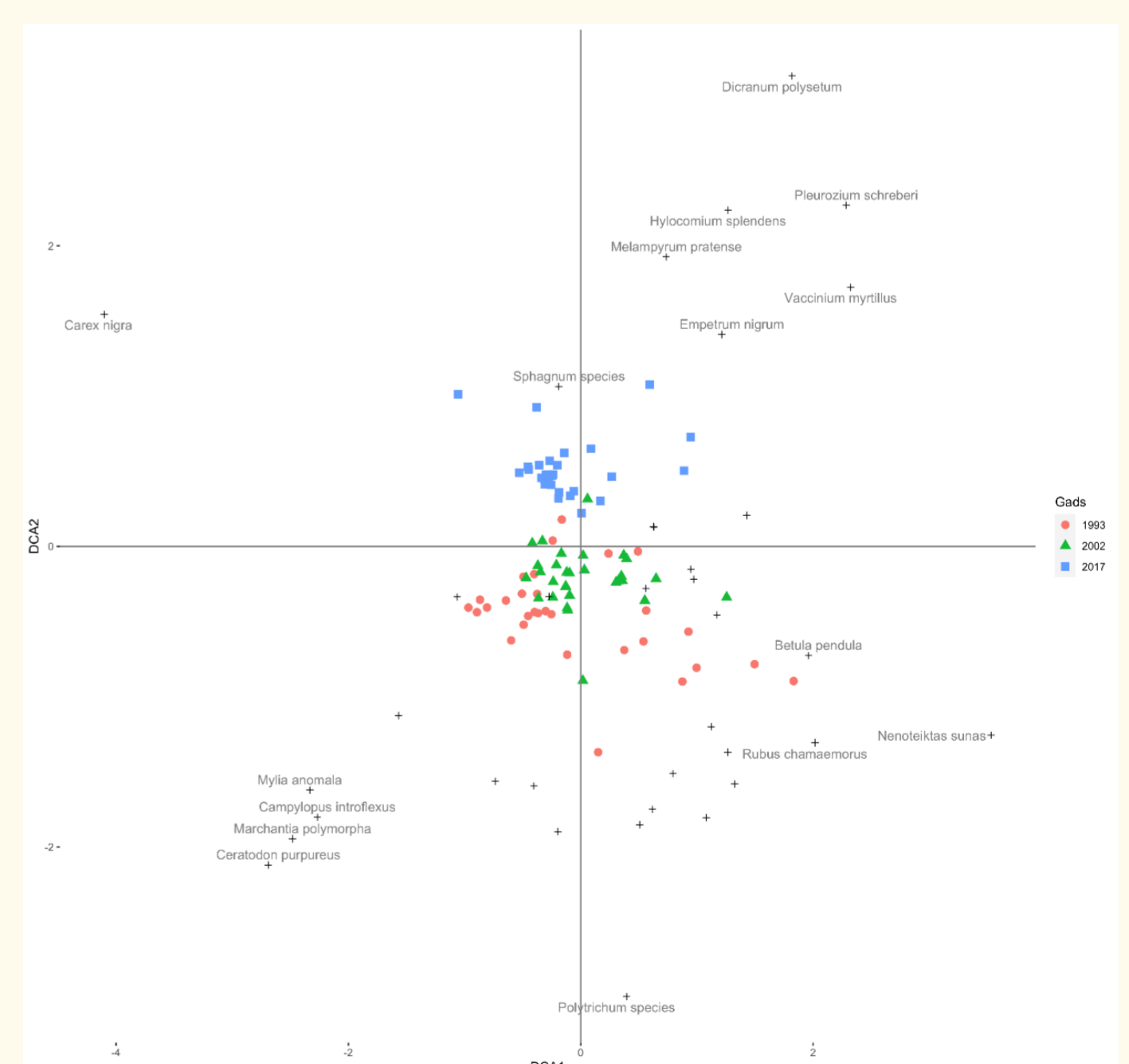


Figure 2. The detrended correspondence analysis ordination of the ground cover vegetation in the high bog biotope by years.

## Conclusions

1. 25 years after forest fires, habitats still show differences between 1993, 2002 and 2017 vegetation composition and percentage cover.
2. The percentage coverage of certain species indicates that stability is observed of the percentage cover 10 years after the fire.
3. Fire is a significant disturbance that has a long-term effect on habitat.

## Contacts

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