MEETINGS OF THE BOTANICAL SOCIETY

Section for Vegetation Research

D. TEUNISSEN: *(Laboratorium voor Geologie, Universiteit, Nijmegen)*

Some aspects of the forest history in Late Glacial and Early Holocene times in the vicinity of Nijmegen (The Netherlands).

The palynological investigations, performed at the geological laboratory of the Catholic University of Nijmegen, chiefly confine themselves to the eastern middle Netherlands (the southeastern half of the province of Gelderland, northeastern Brabant and the northern part of Limburg). In this part of the country extensive peat regions do not occur. The peaty sediments present are found in abandoned (fossil) river beds, in small lakes, and in local depressions. The advantage of this is that the fossil pollen associations give a fairly accurate idea of the contemporary regional airborne pollen.

The organic sedimentation in the region studied began locally in some abandoned river branches during the Bølling Interstadial. *Betula* was the most frequent tree. In addition to *Betula nana*, the first large birches will then have occurred (VAN DER HAMMEN 1951.) In the vicinity of Nijmegen, the *Pinus* pollen was so numerous at that time, that it is doubtful if it arrived by long distance transport exclusively. Pollen of thermophile trees does not occur. The tree and non-tree pollen are in equilibrium (park landscape). In the Older Dryas time *Betula* dominates strongly within the tree pollen. It is possible, that the large birches disappeared and only *Betula nana* could maintain itself. The non-tree pollen dominates the tree pollen (park tundra?). In view of the frequency of the pollen of *Plantago*, *Helianthemum*, *Hippophaë* and *Artemisia*, the vegetation must have had a steppe-like accent; so the climate had a continental character. The same conditions presented themselves in regions situated both more northerly and more southerly in the Netherlands.

In the Allerød time the forests became more or less closed, in the beginning *Betula* was dominant; later on *Pinus* took over the lead. Near Nijmegen the dominance of the pine over the birch is rather strong during the *Pinus* phase, strikingly stronger than in the northern part of the Netherlands and somewhat weaker than in the southern part (VAN DER HAMMEN 1951; VAN ZEIST 1955; JANSSEN 1960). It is clear that *Pinus* immigrated from southerly directions. In the vicinity of Nijmegen, considerable differences in vegetation composition can be established within comparatively short distances. In the Jounger Dryas time another park landscape developed. *Pinus* for the greater part retreated from the northern Netherlands, in favour of *Betula*. In the southern part of the country the pine maintained itself much better. The steppe plants, which fell off strongly during the Allerød time hardly recovered in the north, but attained a rather good recuperation in the south. In some places near Nijmegen *Betula* slightly superseded *Pinus*. In other places however, the pine could maintain the majority. The steppe elements could recover to some degree. Here too a closer connection with the south of the country becomes clear. The behaviour of *Pinus* probably is a reflection of a climate becoming more severe in northerly areas; while the behaviour of the steppe elements speaks of oceanic influences extending gradually to the southeast. The Preboreal starts with a birch phase in the northern part of the Netherlands and with a pine phase in the southern part. Near Nijmegen the pine dominated nearly everywhere, so that here too we see a greater affinity with the southern part of the country. The steppe elements disappear from the scene. From then on thermophile trees began to immigrate into these regions. Once more it becomes evident then, that rather great differences in forest composition can arise within relatively short distances. It appears that this is a common phenomenon in vegetations in which exogene factors (i.e. climatic changes) induce important transformations (immigration of new species, withdrawal of extant ones, etc.).

More extensive investigations into these phenomena are in preparation in our laboratory.

REFERENCES

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JANSSEN, C. R. (1960): *On the Late-Glacial and Post-Glacial vegetation of South Limburg (Netherlands).* Thesis. Utrecht.

ZEIST, W. VAN (1955): *Pollen analytical investigations in the northern Netherlands, with special reference to archaeology.* Thesis. Utrecht.

A. H. J. FREIJSEN: *(Biological Station "Weevers Duin", Oostvoorne)*

The germination of Centaurium vulgare Rafn, some observations on field plots[1]

The germination and early development of *Centaurium vulgare* Rafn were studied in a dune slack near Oostvoorne (The Netherlands). The numbers of juvenile plants of this species were counted four times in 1965 on two field plots, which had been dug up and sown with seeds of *Centaurium vulgare* before. Plot 1 and 2 (see Table 1) were situated on the flank and the bottom of the slack respectively. The difference in height was 54 cm.

Table 1. Numbers of juvenile *Centaurium*-plants on two field plots of 1 m² size.

Plot 1

date	10 June	15 July	August	12 October
seedlings	± 1950	48	0	2
rosettes	161	± 1300		± 380
yellow rosettes	6	42		± 270
total numbers	± 2100	± 1400		± 650

Plot 2

date	16 June	21 July	30 August	13 October
seedlings	48	126	26	4
rosettes	6	24	181	70
yellow rosettes	26	58	31	0
total numbers	80	208	238	74

±: these figures are based on estimations

On field plot 1 mass germination took place in the last week of April and in May. The highest number of seedlings was counted in June. During the summer no germination was observed. In the autumn only two (newly shed?) seeds germinated. Many seedlings developed rapidly into young rosettes. Most specimens of this stage were counted at the second census already. During the summer many juvenile plants turned yellow, died off and disappeared. The mortality amounted to 70%.

At the first count on plot 2 the number of seedlings was only 2,5% of that on plot 1 increasing afterwards, and even in August seeds germinated. The growth rate of the plants on plot 2 was low. Not untill the third inspection the maximal number of rosettes was counted. Also in the open population of plot 2 degenerate yellow rosettes occurred. The relative mortality was as high as on plot 1 i.e. 70%.

In the spring the soil surface of plot 1 was moistened by uprising capillary water, and consequently many seeds could germinate. In the summer strong desiccation took place, making

[1] Lecture at the 61st meeting of the section Ecology of the Royal Botanical Society of the Netherlands, on April 19th, 1966.

germination impossible. At the same time the rather low water content and the good aeration in the root zone promoted the growth of the young plants. Competition was the reason why the population density diminished. As a consequence of unfavourable water and temperature conditions the emergence of seedlings in the autumn was negligible.

During the period before June 16th plot 2 was either flooded or its soil was waterlogged. Excess of water and consequently oxygen deficiency may be regarded as the main cause of the low values of germination rate and germination percentage. The further development of the seedlings was also retarded by the high moisture content of the soil, which, on the other hand, made germination possible in the dry season.

For a complete description of these investigations the reader is referred to FREIJSEN (1967).

REFERENCE

FREIJSEN, A. H. J. (1967): *A field study on the ecology of Centaurium vulgare Rafn.* Thesis Utrecht.