

## ON THE OCCURRENCE OF VISCUM ALBUM L. subsp. ALBUM (LORANTHACEAE) IN THE NETHERLANDS

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### SUMMARY

By comparing a recent inventory of *Viscum album* L. (DE GRAAF 1980) with older data, it appeared that the number of provenances in The Netherlands has decreased drastically in recent years. However, the methods usually applied by Dutch botanists to determine the degree of this decline appears to be inadequate. This follows from a comparison of distribution maps based on different grid widths.

Analysis of the habitats of *Viscum* supports the surmise that the phytogeographical Chalk and Loess Districts cf. VAN SOEST (1929, 1977) should be rejoined into one Centreuropean District (cf. VAN SOEST 1925).

### 1. INTRODUCTION

*Viscum album* L., a hemiparasite of the Loranthaceae, occurs almost all over Europe, with the exception of Ireland, Scotland, and the Northern parts of Norway, Sweden and Finland (VON TUBEUF 1923; BALL 1964; MEUSEL et al. 1965).

In The Netherlands only the subsp. *album* is found, as a hemiparasite on deciduous trees. This country and especially the Southern part of the province of Limburg, together with adjacent parts of Belgium and Western Germany, forms part of the Northern border of its distribution area.

Since 1900, a decrease in the number of provenances was surmised (De Wever, unpublished) but this was not recorded and explained satisfactorily.

This article presents the results of an inventory of *Viscum* carried out in the winter of 1978–1979 (DE GRAAF 1980) and a comparison with older data (DE WEVER 1917, 1932, 1938, 1939, unpublished notes).

The oldest reports on *Viscum* in the Netherlands (COMMALIJN 1709; DE GORTER 1781) may be unreliable as to the host trees mentioned, e.g. *Betula pendula* Roth, on which *Viscum* is never (or seldom) seen again in The Netherlands. Confusion with witches brooms, frequently found on these species, is apparent (DE WEVER 1917). Furthermore the localities mentioned there are outside the known Dutch distribution area. Though the oldest complete inventory of *Viscum* dates from 1910–1920 (DE WEVER 1917, and unpublished data), the year 1950 has been chosen as a reference in accord with the Atlas of the Dutch Flora (MENNEMA et al. 1980).

## 2. RESULTS

The distribution of *Viscum* in The Netherlands is shown in fig. 1 in a  $5 \times 5$  km grid, distinguishing between localities before 1950, before and after 1950, and after 1950.

A much better view of changes in distribution in the South of Limburg, and a more detailed comparison, is obtained on the base of a  $1 \times 1$  km grid (fig. 2). For the other Dutch stations of fig. 1, this was not necessary, all representing only one find per  $5 \times 5$  km. In order to make an even more refined comparison, the results are also plotted in a  $\frac{1}{2} \times \frac{1}{2}$  km grid (fig. 3). A more detailed plotting seemed meaningless since we do not know the precision of the De Wever (1 : 50,000) map (DE GRAAF 1980).

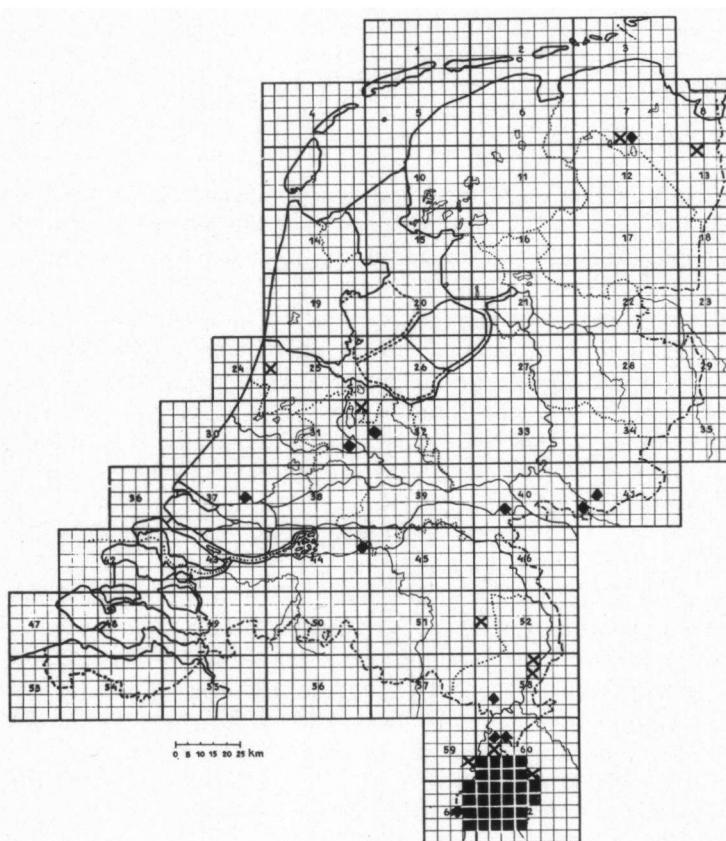


Fig. 1. Distribution of *Viscum album* L. subsp. *album* in The Netherlands.  $\times$  = record before 1950; ■ = record before and after 1950; ◆ = record after 1950.

### 3. THE DECLINE OF VISCUM ALBUM

Evaluating the distribution data on different scales leads to very diverging conclusions (*table 1*). The number of stations is given, based on the different grids from the *figs. 1, 2* and *3*. It will be obvious that an inventory based on a  $5 \times 5$  km grid (*fig. 1*) leads to wrong conclusions, if no further information is given. More in general the  $5 \times 5$  km distribution frequencies, as are usually applied in the studies of the Dutch flora (among others VAN DER MAAREL 1971; MENNEMA 1973; QUENÉ-BOTERENBROOD 1975; ARNOLDS & VAN DER MEIJDEN 1976; PLATE 1978; MENNEMA et al. 1980), may lead to an optimistic interpretation of a serious decline. Though a possible difference in observation intensity before and after 1950 outside the province of Limburg may explain the large number of new finding places, the observation intensity during the 1978–1979 inventory will not have been responsible for the sharp decline in the Southern part of Limburg.

In order to single out the causes of this decline, it is important to know which host trees *Viscum* prefers (*table 2*, based on DE WEVER 1917, 1932, 1938, 1939 and various unpublished notes; VON TUBEUF 1923; CUPEDO 1977; REMY 1977; FELDER 1979; GILISSEN 1979; DE GRAAF 1980). DE WEVER (1938 and unpublished) only stated that *Viscum* occurs as much on *Malus domestica* Borkh. (various cultivars) as on *Populus nigra* L., *P. deltoides* Marsh. and *P. × canadensis* Moench together. The suggestion arises that *M. domestica* was lost as a host tree for the greater part and that this constitutes the main reason of the decline.

The surface area occupied by orchards having increased since the 15th century, declined strongly after 1950. This decline especially affected the old orchards where fruit culture, grazing and hay-making were combined (VAN DE WESTERINGH 1975a, 1975b). The modern orchards probably are less suitable to the establishment of *Viscum*.

The expansion of urban agglomeration may have been an additional factor: the largest decrease in number took place in the Northeastern part of the mapped area (*fig. 2*) near the expanding cities of Kerkrade, Heerlen, Hoensbroek and Brunsum. Here *Viscum* thrives only in relatively old rural areas along the brooks Caumerbeek and Geleenbeek.

Table 1. Number of finds of *Viscum album*.

	before 1950	after 1949	balance
	total	new recent finding places	
The Netherlands:			
The Southern part of Limburg:			
$5 \times 5$ km squares	40	42	+ 5%
$1 \times 1$ km squares	31	1 ( 3 %)	-
$\frac{1}{2} \times \frac{1}{2}$ km squares	334	59 (33 %)	-46 %
	621	268 (46 %)	-57 %

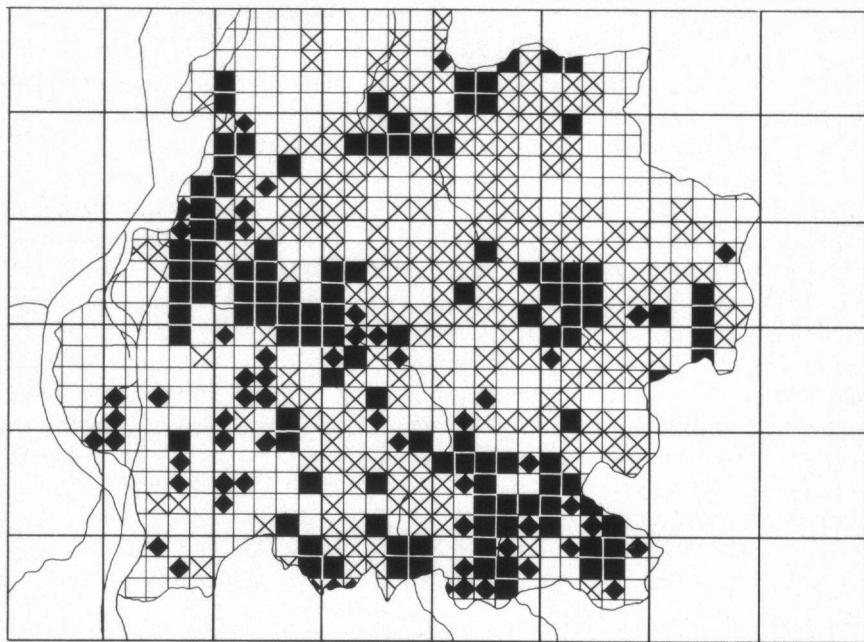


Fig. 2. Distribution of *Viscum album* L. subsp. *album* in the Southern part of Limburg based on a km grid.

Legend cf. fig. 1.

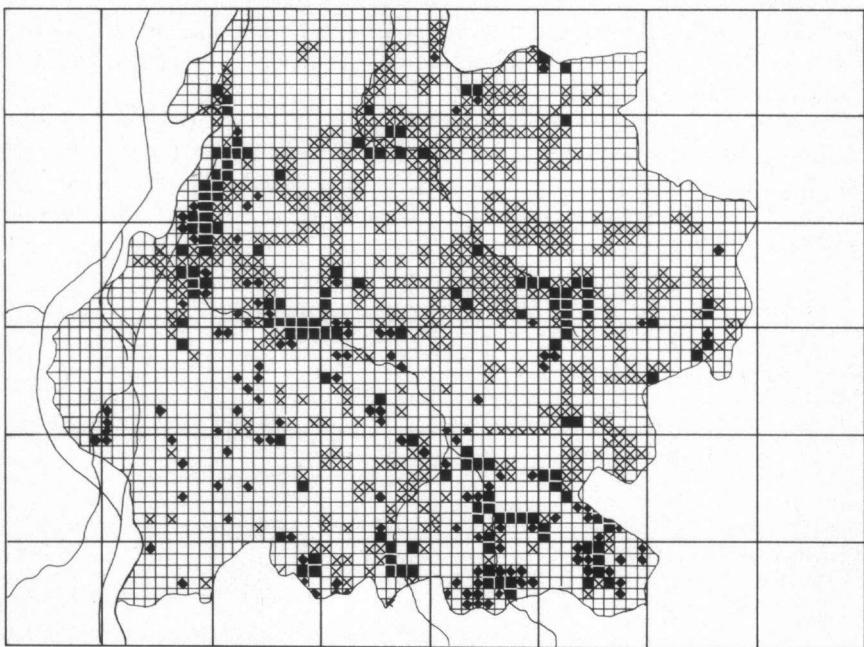


Fig. 3. Distribution of *Viscum album* L. subsp. *album* in the Southern part of Limburg based on a  $\frac{1}{4}$  km grid.

Legend cf. fig. 1.

Table 2. Host trees of *Viscum album* in the southern part of Limburg.

	before 1950 (after DE WEVER, l.c.)	number	number	average number of <i>Viscum</i> plants per host tree
<i>Populus</i> spec.	?	1146	3.1	
<i>Malus domestica</i> Borkh.	?	311	3.4	
<i>Robinia pseudo-acacia</i> L.	10	35	1.9	
<i>Tilia</i> spec.	10	20	8.1	
<i>Crataegus monogyna</i> L.	39	18	30.3	
<i>Pyrus communis</i> L.	31	1	1	
<i>Salix alba</i> L.	8	4	6.1	
<i>Fraxinus excelsior</i> L.	1	1	1	
<i>Betula pendula</i> Roth.	—	2	2.5	
<i>Betula pubescens</i> Ehrh.	—	1	2	
<i>Corylus avellana</i> L.	—	2	1	
<i>Fraxinus americana</i> L.	—	1	10	
Other	41	—	—	

To our knowledge, *Viscum* plants were seldom removed from the host trees (table 2), except for *Malus domestica*. The markedly large number of recent stations in the South of Limburg, predominantly on *Populus*, shows that *Viscum* can thrive and even spread, provided that suitable host trees are available. In order to conserve the species it is advisable to give the *Populus* plantations a longer turnover time, whilst renewing should take place very gradually; furthermore the still remaining old orchards should be preserved.

#### 4. THE HABITAT OF VISCUM ALBUM

In The Netherlands *Viscum* occurs almost exclusively on calcareous soils. These are the areas where limestone of the Upper Cretaceous reaches the surface, places where Tertiary deposits with fossil shells crop out, the calcareous loess deposits on top of the hills and the moist alluvial brook basins which can be very rich in lime, especially at some depth (VAN RUMMELEN 1936).

The very stable Northern limit of the distribution area of *Viscum* in the province of Limburg (DE WEVER 1932) almost coincides with the borderline between loamy calcareous soils on the Southern side and the leached sandy soils and older clays on the Northern side (STIBOKA 1970). A correlation between the occurrence of calcareous soils and the distribution pattern of *Viscum album* subsp. *album* also holds for Belgium (LAURENT 1901) and Luxembourg (KLEIN 1920).

In The Netherlands *Viscum* is generally considered a characteristic species for the phytogeographical Chalk District (cf. VAN SOEST 1929, 1977). However, if the Northern border of the Upper Cretaceous Limestone (cf. KUYL 1971) is

taken as the Northern limit of the Chalk District, it appears that only half of the known stations occurs in this Chalk District. Of all the finds later than 1950 even 60% lay in the adjacent Loess District. These data support the conclusion of HOMMEL (1979) that the phytogeographical classification of VAN SOEST (1929) should be re-considered and that a combination of Loess and Chalk Districts into the original Centreuropean District *sensu* VAN SOEST (1925) is more appropriate.

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