

CHROMOSOME NUMBERS OF FLOWERING PLANTS  
IN THE NETHERLANDS, IV

BY

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INTRODUCTION

The present paper, the fourth in this series, is a continuation of the documented list of chromosome numbers of *Angiospermae* occurring in the Netherlands. In this paper 86 species are listed. Some species show variation in chromosome number within their range, as was concluded after comparison of our results with those of other authors [cf. the lists published by LÖVE and LÖVE (1961), CAVE *et al.* (1961–1964) and ORNDUFF (1967)]. Some notes on 6 species are given.

MATERIALS AND METHODS

Some plants were transferred from their natural habitat to the experimental plot, but in many other cases the plants were grown from seeds collected in nature. In all cases roottips were used for the study of metaphase-plates. The roottips were fixed in Karpechenko's fixative, embedded in paraffin, sectioned at 15 micron and stained according to Heidenhain's haematoxylin method. The roottips of *Ranunculaceae*-species were squashed in Feulgen after a pretreatment in colchicin 0,1 % for 4–5 hours and fixation in Carnoy's fixative.

Voucher specimens and the microscopical preparations have been deposited in the Herbarium of the State University of Utrecht.

RESULTS

The results are listed in the table

TABLE

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Alismataceae

*Alisma lanceolatum* With.

coll. no.: G. et K. 4408; 4422 . . . . . 2n=24  
origin: Near Oud-Zevenaar (prov. of Gelderland)

Ref.: TARNAVSCHI, (1948): 2n=24; TSCHERMAK-WOESS, (1948),  
CASTRO and NORONHA-WAGNER, (1950), POGAN, (1961,  
1962): 2n=26; HAGERUP, (1944), ERLANDSSON, (1946),  
LÖVE and LÖVE, (1948), PRIESTLEY, (1953): 2n=28.

**Boraginaceae***Myosotis discolor* Pers.

coll. no.: G. et K. 4044 . . . . . 2n = 64

origin: Gimborn arboretum near Doorn (prov. of Utrecht),  
spontaneous*Myosotis ramosissima* Rochel ex Schult.

coll. no.: G. et K. 4312 . . . . . 2n = 48

origin: Dunes near Oost-Voorne (prov. of Zuid-Holland)

**Callitrichaceae***Callitriche platycarpa* Kütz.

coll. no.: G. et K. 4369 . . . . . 2n = 20

origin: Breuly near Oud-Zevenaar (prov. of Gelderland)

**Campanulaceae***Phyteuma spicatum* L.

coll. no.: G. et K. 3915 . . . . . 2n = 22 + 2B

origin: Ulvenhout, near Breda (prov. of Noord-Brabant)

Ref.: GADELLA, (1966), POLATSCHKEK, (1966): 2n=22; OCH-  
LEWSKA, (1965): 2n=22+0-3B; CONTANDRIOPOULOS,  
(1962): 2n=24, (in the drawing only 23 chromosomes  
are indicated); ARMAND, (1912): 2n=36.**Caryophyllaceae***Arenaria serpyllifolia* L.

coll. no.: G. et K. 3168 . . . . . 2n = 40

origin: NE. of Oosterburen. Isle of Schiermonnikoog  
(prov. of Friesland)*Sagina maritima* G. Don

coll. no.: G. et K. 4130 . . . . . 2n = 28

origin: Hondsbossche Zeewering, near Camperduin (prov.  
of Noord-Holland)*Scleranthus perennis* L.

coll. no.: G. et K. 4200 . . . . . 2n = 22

origin: Near Ommen (prov. of Overijssel)

*Silene nutans* L.

coll. no.: G. et K. 4104 . . . . . 2n = 24

origin: Dunes near Bergen aan Zee (prov. of Noord-  
Holland)*Stellaria graminea* L.

coll. no.: G. et K. 5915 . . . . . 2n = 52

origin: E. of Oosterend, Isle of Terschelling (prov. of  
Friesland)Ref.: PETERSON, (1936), ROHWEDER, (1939), BLACKBURN and  
MORTON, (1957): 2n=26; GADELLA and KLIPHUIS, (1967):  
2n=39.

## Chenopodiaceae

*Atriplex hastata* L.

coll. no.: G. et K. 3172 . . . . . 2n=18, 32, 36, 64

origin: S. of Oosterburen, Isle of Schiermonnikoog (prov. of Friesland)

Ref.: Lövne and Lövne, (1961): in all cited counts 2n=18.

## Compositae

*Achillea ptarmica* L.

coll. no.: G. et K. 4838, 4842 . . . . . 2n=18

origin: Sliedrechtse Biesbosch (prov. of Zuid-Holland)

*Arnica montana* L.

coll. no.: G. et K. 3951 . . . . . 2n=36

origin: Gorssel, near Deventer (prov. of Overijssel)

coll. no.: G. et K. 3952 . . . . . 2n=38

origin: Near Wolfheze (prov. of Gelderland)

coll. no.: G. et K. 3953 . . . . . 2n=38

origin: Near Zeijen (prov. of Drenthe)

*Artemisia maritima* L.

coll. no.: G. et K. 4109, 4110 . . . . . 2n=54

origin: Hondsbossche Zeewering, near Camperduin (prov. of Noord-Holland)

*Centaurea pratensis* Thuill.

coll. no.: G. et K. 3186 . . . . . 2n=44

origin: Near Wijlre (prov. of Limburg)

*Carduus nutans* L.

coll. no.: G. et K. 3164 . . . . . 2n=16

origin: S. of Oosterburen, Isle of Schiermonnikoog (prov. of Friesland)

*Chrysanthemum segetum* L.

coll. no.: G. et K. 4184 . . . . . 2n=18

origin: Between Helvoirt and Cromvoirt (prov. of Noord-Brabant)

*Erigeron acer* L.

coll. no.: G. et K. 4008-4010 . . . . . 2n=18

origin: Near Speuld (prov. of Gelderland)

*Hieracium amplexicaule* L.

coll. no.: G. et K. 3178 . . . . . 2n=36

origin: Near Wijlre (prov. of Limburg)

*Hieracium umbellatum* L.

coll. no.: G. et K. 3169 . . . . . 2n=18

origin: NE. of Oosterburen, Isle of Schiermonnikoog (prov. of Friesland)

*Leontodon hispidus* L.

- coll. no.: G. et K. 3198 . . . . . 2n = 14  
 origin: Near Wijlre (prov. of Limburg)

*Senecio jacobaea* L.

- coll. no.: G. et K. 3170 . . . . . 2n = 40  
 origin: E. of Oosterburen, Isle of Schiermonnikoog (prov. of Friesland)

*Sonchus arvensis* L.

- coll. no.: G. et K. 1504 . . . . . 2n = 54  
 origin: Near Monnikendam (prov. of Noord-Holland)  
 coll. no.: G. et K. 1562 . . . . . 2n = 54  
 origin: Near IJsselstein, in an osierbed (prov. of Utrecht)

**Cruciferae***Diplotaxis tenuifolia* (L.) DC.

- coll. no.: G. et K. 3999 . . . . . 2n = 22  
 origin: Near Lelystad, Oost Flevoland

*Rorippa amphibia* (L.) Besser

- coll. no.: G. et K. 4501 . . . . . 2n = 32  
 origin: Near Oud-Zevenaar (prov. of Gelderland)

**Dipsacaceae***Knautia arvensis* (L.) Coulter

- coll. no.: G. et K. 3222 . . . . . 2n = 40  
 origin: Near Wijlre (prov. of Limburg)  
 Ref.: WULFF, (1938), POLYA, (1949), EHRENDORFER, (1962):  
 2n = 20; KACHIDZE, (1929), HAGERUP, (1941), LÖVE and  
 LÖVE, (1944, 1956), SORSA, (1962), EHRENDORFER, (1962):  
 2n = 40.

*Scabiosa columbaria* L.

- coll. no.: G. et K. 3187 . . . . . 2n = 16  
 origin: Near Wijlre (prov. of Limburg)

**Euphorbiaceae***Euphorbia esula* L.

- coll. no.: G. et K. 4398, 4401 . . . . . 2n = 64  
 origin: Near Oud-Zevenaar (prov. of Gelderland)  
 coll. no.: G. et K. 4438, 4442, 4443 . . . . . 2n = 64  
 origin: Lobberdenwaard, south of Pannerden (prov. of Gelderland)

*Euphorbia helioscopia* L.

- coll. no.: G. et K. 4599 . . . . . 2n = 42  
 origin: Vogelwaarde, Zeeuws-Vlaanderen (prov. of Zeeland)

*Euphorbia palustris* L.  
 coll. no.: G. et K. 4833 . . . . . 2n = 20  
 origin: Sliedrechtse Biesbosch (prov. of Zuid-Holland)

*Euphorbia pepylus* L.  
 coll. no.: G. et K. 4601 . . . . . 2n = 16  
 origin: Vogelwaarde, Zeeuws-Vlaanderen (prov. of Zeeland)

### Gentianaceae

*Centaurium minus* Moench  
 coll. no.: G. et K. 3210 . . . . . 2n = 42  
 origin: Near Wijlre (prov. of Limburg)

### Gramineae

*Agrostis tenuis* Sibth.  
 coll. no.: G. et K. 1425 . . . . . 2n = 28  
 origin: Near Klein Wasmear, south of Hilversum (prov. of Noord-Holland)

*Apera spica-venti* (L.) P.B.  
 coll. no.: G. et K. 4185 . . . . . 2n = 14  
 origin: Between Helvoirt and Cromvoirt (prov. of Noord-Brabant)

*Brachypodium pinnatum* (L.) P.B.  
 coll. no.: G. et K. 3216 . . . . . 2n = 28  
 origin: Near Wijlre (prov. of Limburg)

*Briza media* L.  
 coll. no.: G. et K. 3211 . . . . . 2n = 14  
 origin: Near Wijlre (prov. of Limburg)

*Festuca ovina* L.  
 coll. no.: G. et K. 3965 . . . . . 2n = 14  
 origin: Near Speuld (prov. of Gelderland)

*Festulolium loliaceum* (Huds.) P. Fourn.  
 coll. no.: G. et K. 2581 . . . . . 2n = 14  
 origin: Near Kuttingen, south of Epen (prov. of Limburg)

*Holcus lanatus* L.  
 coll. no.: G. et K. 1439 . . . . . 2n = 14  
 origin: Fort Hoofddijk, de Bilt (prov. of Utrecht)

*Koeleria albescens* DC.  
 coll. no.: G. et K. 4094 . . . . . 2n = 14  
 origin: Near Bergen aan Zee (prov. of Noord-Holland)

*Phleum arenarium* L.  
 coll. no.: G. et K. 4311 . . . . . 2n = 14  
 origin: Dunes near Oost-Voorne (prov. of Zuid-Holland)

**Haloragaceae***Myriophyllum alterniflorum* DC.

- coll. no.: G. et K. 4382 . . . . . 2n = 14  
 origin: Heelsumse Beek, near Heelsum (prov. of Gelderland)

**Labiatae***Scutellaria galericulata* L.

- coll. no.: G. et K. 4006 . . . . . 2n = 31  
 origin: Knardijk near Harderwijk, Oost Flevoland

*Stachys officinalis* (L.) Trevisan

- coll. no.: G. et K. 3176 . . . . . 2n = 16  
 origin: Near Wijlre (prov. of Limburg)

*Thymus pulegioides* L.

- coll. no.: G. et K. 4096 . . . . . 2n = 28  
 origin: Dunes near Bergen aan Zee (prov. of Noord-Holland)

**Linaceae***Linum catharticum* L.

- coll. no.: G. et K. 3988 . . . . . 2n = 16  
 origin: Between Nieuw-Milligen and Ermelo (prov. of Gelderland)

**Lythraceae***Lythrum salicaria* L.

- coll. no.: G. et K. 3985-3987 . . . . . 2n = 60  
 origin: Between Nieuw-Milligen and Ermelo (prov. of Gelderland)

*Peplis portula* L.

- coll. no.: G. et K. 4258 . . . . . 2n = 10  
 origin: Between Helvoirt and Cromvoirt (prov. of Noord-Brabant)

**Menyanthaceae***Nymphoides peltata* (Gmel.) O. Kuntze

- coll. no.: G. et K. 4513 . . . . . 2n = 54  
 origin: Near Babberich (prov. of Gelderland)

**Oenotheraceae***Circaea lutetiana* L.

- coll. no.: G. et K. 3896 . . . . . 2n = 22  
 origin: Rhijnauwen near Utrecht (prov. of Utrecht)  
 coll. no.: G. et K. 4789, 4796-4799 . . . . . 2n = 22  
 origin: Sliedrechtse Biesbosch (prov. of Zuid-Holland)

*Epilobium hirsutum* L.

- coll. no.: G. et K. 6235 . . . . . 2n = 36  
 origin: Sliedrechtse Biesbosch (prov. of Zuid-Holland)

**Papaveraceae***Chelidonium majus* L.

- coll. no.: G. et K. 3182 . . . . . 2n = 12  
 origin: Near Wijlre (prov. of Limburg)

**Papilionaceae***Anthyllis vulneraria* L.

- coll. no.: G. et K. 3215 . . . . . 2n = 12  
 origin: Near Wijlre (prov. of Limburg)

*Lotus corniculatus* L.

- coll. no.: G. et K. 3195 . . . . . 2n = 24  
 origin: Near Wijlre (prov. of Limburg)  
 coll. no.: G. et K. 4421 . . . . . 2n = 24  
 origin: Breuly near Oud-Zevenaar (prov. of Gelderland)  
 coll. no.: G. et K. 5923 . . . . . 2n = 24  
 origin: Heath near Landerum, Isle of Terschelling (prov. of Friesland)

*Melilotus albus* Med.

- coll. no.: G. et K. 3960-3963 . . . . . 2n = 16  
 origin: Near Lelystad, Oost Flevoland

*Medicago lupulina* L.

- coll. no.: G. et K. 3217 . . . . . 2n = 16  
 origin: Near Wijlre (prov. of Limburg)  
 coll. no.: G. et K. 3959 . . . . . 2n = 16  
 origin: Near Lelystad, Oost Flevoland

*Ononis spinosa* L.

- coll. no.: G. et K. 4437 . . . . . 2n = 30  
 origin: Breuly near Oud Zevenaar (prov. of Gelderland)  
 coll. no.: G. et K. 1406 . . . . . 2n = 32  
 origin: Grebbeberg near Rhenen (prov. of Utrecht)  
 coll. no.: G. et K. 4424 . . . . . 2n = 32  
 origin: Near Oud Zevenaar (prov. of Gelderland)  
 coll. no.: G. et K. 5918 . . . . . 2n = 32  
 origin: E. of Oosterend, Isle of Terschelling (prov. of Friesland)

*Ornithopus perpusillus* L.

- coll. no.: G. et K. 4011-4012 . . . . . 2n = 14  
 origin: Near Speuld (prov. of Gelderland)

*Trifolium campestre* Schreb.

- coll. no.: G. et K. 3175 . . . . . 2n = 14  
 origin: N. of Oosterburen, Isle of Schiermonnikoog (prov.  
 of Friesland)

*Trifolium fragiferum* L.

- coll. no.: G. et K. 5913 . . . . . 2n = 16  
 origin: National Park "de Boschplaat", Isle of Ter-  
 schelling (prov. of Friesland)

*Trifolium pratense* L.

- coll. no.: G. et K. 3218 . . . . . 2n = 14  
 origin: Near Wijlre (prov. of Limburg)

**Plantaginaceae***Plantago coronopus* L.

- coll. no.: G. et K. 2558, 2562 . . . . . 2n = 10  
 origin: Hondsbossche Zeewering near Camperduin (prov.  
 of Noord-Holland)

*Plantago maritima* L.

- coll. no.: G. et K. 2414 . . . . . 2n = 12  
 origin: E. of Oosterend, Isle of Terschelling (prov. of  
 Friesland)  
 coll. no.: G. et K. 3159 . . . . . 2n = 12  
 origin: S. of Oosterburen, Isle of Schiermonnikoog (prov.  
 of Friesland)  
 coll. no.: G. et K. 3166 . . . . . 2n = 12  
 origin: SW. of Oosterburen, Isle of Schiermonnikoog  
 (prov. of Friesland)

*Plantago media* L.

- coll. no.: G. et K. 3185 . . . . . 2n = 24  
 origin: Near Wijlre (prov. of Limburg)  
 coll. no.: G. et K. 4455 . . . . . 2n = 24  
 origin: Breuly near Oud-Zevenaar (prov. of Gelderland)

**Primulaceae***Lysimachia vulgaris* L.

- coll. no.: G. et K. 1490 . . . . . 2n = 84  
 origin: Near Diphorn (prov. of Drenthe)  
 coll. no.: G. et K. 3150 . . . . . 2n = 84  
 origin: Fort Hoofddijk, de Bilt (prov. of Utrecht)  
 coll. no.: G. et K. 3913 . . . . . 2n = 84  
 origin: Near Ulvenhout (prov. of Noord-Brabant)  
 coll. no.: G. et K. 3938 . . . . . 2n = 84  
 origin: Near Hilvarenbeek (prov. of Noord-Brabant)



- coll. no.: G. et K. 3967 . . . . . 2n = 84  
 origin: Between Maarsbergen and Maarn (prov. of Utrecht)
- coll. no.: G. et K. 3972 . . . . . 2n = 84  
 origin: Between Barneveld and Renswoude (prov. of  
 Gelderland)
- coll. no.: G. et K. 4018 . . . . . 2n = 84  
 origin: Gimborn arboretum, Doorn (prov. of Utrecht),  
 spontaneous.
- coll. no.: G. et K. 4027 . . . . . 2n = 84  
 origin: Quakjeswater near Rockanje (prov. of Zuid-  
 Holland)
- coll. no.: G. et K. 4061 . . . . . 2n = 84  
 origin: S. of Epen (prov. Limburg)
- coll. no.: G. et K. 4252 . . . . . 2n = 84  
 origin: Near Liempde (prov. of Noord-Brabant)
- coll. no.: G. et K. 4281 . . . . . 2n = 84  
 origin: Between Cromvoirt and Helvoirt (prov. of Noord-  
 Brabant)
- coll. no.: G. et K. 4309 . . . . . 2n = 84  
 origin: Near Oost-Voorne (prov. of Zuid-Holland)
- coll. no.: G. et K. 4413 . . . . . 2n = 84  
 origin: Near Heelsum (prov. of Gelderland)
- coll. no.: G. et K. 4428 . . . . . 2n = 84  
 origin: Near Oud-Zevenaar (prov. of Gelderland)
- coll. no.: G. et K. 4755 . . . . . 2n = 84  
 origin: Molenpolder near Westbroek (prov. of Utrecht)
- coll. no.: G. et K. 4779 . . . . . 2n = 84  
 origin: Near Moergestel (prov. of Noord-Brabant)
- Ref.: LEVITSKY in litt. (in TISCHLER, 1937): 2n=28; GADELLA  
 and KLIPHUIS, (1963, 1966): 2n=56.

*Samolus valerandi* L.

- coll. no.: G. et K. 3237, 3238 . . . . . 2n = 26  
 origin: National Park "de Boschplaat", Isle of Ter-  
 schelling, (prov. of Friesland)
- coll. no.: G. et K. 3231 . . . . . 2n = 26  
 origin: Heveringen, Isle of Voorne (prov. of Zuid-Holland)
- coll. no.: G. et K. 3232 . . . . . 2n = 26  
 origin: Near Rockanje, Isle of Voorne (prov. of Zuid-  
 Holland)
- coll. no.: G. et K. 3233 . . . . . 2n = 26  
 origin: Former airstrip near Oost-Voorne, (prov. of Zuid-  
 Holland)
- coll. no.: G. et K. 3234, 3236 . . . . . 2n = 26  
 origin: De Koegelwiek, Hoorn, Isle of Terschelling (prov.  
 of Friesland)

- coll. no.: G. et K. 3240 . . . . . 2n = 26  
 origin: Isle of Goeree (prov. of Zuid-Holland)

### Ranunculaceae

#### *Actaea spicata* L.

- coll. no.: R.4 . . . . . 2n = 16  
 origin: Near Wijlre (prov. of Limburg)

#### *Ranunculus acer* L.

- coll. no.: R.47,R.48 . . . . . 2n = 14  
 origin: Near Putten (prov. of Gelderland) . . . . . 2n = 14

- coll. no.: R.57,R.58 . . . . . 2n = 14  
 origin: South of Epen (prov. of Limburg)

- coll. no.: R.80 . . . . . 2n = 14  
 origin: St. Pietersberg, south of Maastricht (prov. of  
 Limburg)

- coll. no.: R.85 . . . . . 2n = 14  
 origin: Geerendal, south of Schin op Geul (prov. of  
 Limburg)

- coll. no.: R.30,R.96,R.97 . . . . . 2n = 14  
 origin: Near Oost-Voorne (prov. of Zuid-Holland)

- coll. no.: R.112 . . . . . 2n = 14  
 origin: Near Rockanje (prov. of Zuid-Holland)

- coll. no.: R.121 . . . . . 2n = 14  
 origin: Near Oud-Zevenaar (prov. of Gelderland)

- coll. no.: R.160-R.162 . . . . . 2n = 14  
 origin: Between Nieuw Milligen and Ermelo (prov. of  
 Gelderland)

- coll. no.: R.173-R.175 . . . . . 2n = 14  
 origin: Along the Drecht near Leimuiden (prov. of Zuid-  
 Holland)

- coll. no.: R.192 . . . . . 2n = 14  
 origin: Utrecht, in a garden (prov. of Utrecht)

- coll. no.: R.207-R.210,R.215 . . . . . 2n = 14  
 origin: Near Lopik (prov. of Utrecht)

- coll. no.: R.220 . . . . . 2n = 14  
 origin: Molenpolder near Westbroek (prov. of Utrecht)

- coll. no.: R.303,R.305,R.306 . . . . . 2n = 14  
 origin: E. of Oosterend, Isle of Terschelling (prov. of  
 Friesland)

- coll. no.: R.324-R.327 . . . . . 2n = 14  
 origin: Near Leusden (prov. of Utrecht)

#### *Ranunculus auricomus* L.

- coll. no.: R.35,R.36 . . . . . 2n = 32  
 origin: Oud Amelisweerd, near Bunnik (prov. of Utrecht)

- coll. no.: R.92 . . . . . 2n = 32  
 origin: Along the Kromme Rijn, near Bunnik (prov. of Utrecht)
- Ranunculus baudotii* Godr.  
 coll. no.: R.240,R.287 . . . . . 2n = 32  
 origin: Wytdune, Isle of Terschelling (prov. of Friesland)
- Ranunculus bulbosus* L.  
 coll. no.: R.51-R.53 . . . . . 2n = 16  
 origin: Near Putten (prov. of Gelderland)  
 coll. no.: R.81 . . . . . 2n = 16  
 origin: St. Pietersberg, south of Maastricht (prov. of Limburg)  
 coll. no.: R.84 . . . . . 2n = 16  
 origin: Geerendal, south of Schin of Geul (Prov. of Limburg)
- Ranunculus circinatus* Sibth.  
 coll. no.: R.128 . . . . . 2n = 16  
 origin: Near Pannerden (prov. of Gelderland)  
 coll. no.: R.176 . . . . . 2n = 16  
 origin: Near Eembrugge (prov. of Utrecht)
- Ranunculus flammula* L.  
 coll. no.: R.31,R.38 . . . . . 2n = 32  
 origin: Former airstrip near Oost-Voorne (prov. of Zuid-Holland)  
 coll. no.: R.111 . . . . . 2n = 32  
 origin: Quakjeswater near Rockanje (prov. of Zuid-Holland)  
 coll. no.: R.153-R.155,R.157 . . . . . 2n = 32  
 origin: Near Staverden (prov. of Gelderland)  
 coll. no.: R.163-R.167 . . . . . 2n = 32  
 origin: Nieuw-Milligen (prov. of Gelderland)  
 coll. no.: R.190 . . . . . 2n = 32  
 origin: Between Bilthoven and Soestdijk (prov. of Utrecht)  
 coll. no.: R.226-R.228,R.237-R.239 . . . . . 2n = 32  
 origin: Brandeburen, near Workum (prov. of Friesland)  
 coll. no.: R.242-R.246,R.248-R.251,R.253 . . . . . 2n = 32  
 origin: Wytdune, E. of Oosterend, Isle of Terschelling (prov. of Friesland)  
 coll. no.: R.255-R.257,R.274-R.277 . . . . . 2n = 32  
 origin: Noordsvaarder, Isle of Terschelling (prov. of Friesland)  
 coll. no.: R.288,R.289,R.291 . . . . . 2n = 32  
 origin: National Park "de Boschplaat", Isle of Terschelling (prov. of Friesland)

- coll. no.: R.304 . . . . . 2n = 32  
 origin: E. of Oosterend, Isle of Terschelling (prov. of Friesland)
- Ranunculus repens* L.
- coll. no.: R.41,R.42,R.144-R.147. . . . . 2n = 32  
 origin: near Putten (prov. of Gelderland)
- coll. no.: R.58-R.60 . . . . . 2n = 32  
 origin: Near Epen (prov. of Limburg)
- coll. no.: R.113-R.116 . . . . . 2n = 32  
 origin: Dunes near Oost-Voorne (prov. of Zuid-Holland)
- coll. no.: R.122,R.123,R.132,R.133 . . . . . 2n = 32  
 origin: Near Oud-Zevenaar (prov. of Gelderland)
- coll. no.: R.129 . . . . . 2n = 32  
 origin: Lobberdenwaard, Pannerden (prov. of Gelderland)
- coll. no.: R.148-R.152,R.158-R.172 . . . . . 2n = 32  
 origin: Near Staverden (prov. of Gelderland)
- coll. no.: R.177-R.179 . . . . . 2n = 32  
 origin: Roadside near Eembrugge (prov. of Utrecht)
- coll. no.: R.193-R.197 . . . . . 2n = 32  
 origin: In a garden near Utrecht (prov. of Utrecht)
- coll. no.: R.204-R.206,R.211-R.214,R.216-R.218 . . . . . 2n = 32  
 origin: Dike of the river Lek near Lopik (prov. of Utrecht)
- coll. no.: R.221-R.225 . . . . . 2n = 32  
 origin: Molenpolder near Westbroek (prov. of Utrecht)
- coll. no.: R.230-R.234 . . . . . 2n = 32  
 origin: Brandeburen, E. of Workum (prov. of Friesland)
- coll. no.: R.278-R.282 . . . . . 2n = 32  
 origin: Arjensduun, Isle of Terschelling (prov. of Friesland)
- coll. no.: R.307-R.310 . . . . . 2n = 32  
 origin: Meadow near Oosterend, Isle of Terschelling (prov. of Friesland)
- coll. no.: R.328 . . . . . 2n = 32  
 origin: Near Leusden (prov. of Utrecht)
- Ranunculus sardous* Crantz
- coll. no.: R.68 . . . . . 2n = 16  
 origin: Dolsberg near Gulpen (prov. of Limburg)
- coll. no.: R.264,R.266,R.267 . . . . . 2n = 16  
 origin: Near Formerum, Isle of Terschelling (prov. of Friesland)
- Ranunculus sceleratus* L.
- coll. no.: R.142 . . . . . 2n = 32  
 origin: Near Putten (prov. of Gelderland)

- coll. no.: R.258–R.260,R.262 . . . . . 2n = 32  
 origin: Noordsvaarder, Isle of Terschelling (prov. of Friesland)
- coll. no.: R.294,R.295,R.297–R.302. . . . . 2n = 32  
 origin: E. of Oosterend, Isle of Terschelling (prov. of Friesland)

### Rosaceae

#### *Geum rivale* L.

- coll. no.: G. et K. 3914 . . . . . 2n = 42  
 origin: Near Ulvenhout (prov. of Noord-Brabant)

#### *Sanguisorba officinalis* L.

- coll. no.: G. et K. 4836 . . . . . 2n = 56  
 origin: Sliedrechtse Biesbosch (prov. of Zuid-Holland)

### Scrophulariaceae

#### *Pedicularis sylvatica* L.

- coll. no.: G. et K. 3978 . . . . . 2n = 32  
 origin: Between Ermelo and Nieuw-Milligen (prov. of Gelderland)

Ref.: LÖVE and LÖVE, (1944): 2n=16.

#### *Scrophularia neesii* Wirtg.

- coll. no.: G. et K. 5922 . . . . . 2n = 52  
 origin: Near Lies, Isle of Terschelling (prov. of Friesland)

#### *Scrophularia nodosa* L.

- coll. no.: G. et K. 4784, 4785, 4787 . . . . . 2n = 36  
 origin: Sliedrechtse Biesbosch (prov. of Zuid-Holland)

#### *Veronica anagallis-aquatica* L.

- coll. no.: G. et K. 6215 . . . . . 2n = 36  
 origin: Sliedrechtse Biesbosch (prov. of Zuid-Holland)

#### *Veronica arvensis* L.

- coll. no.: G. et K. 4191 . . . . . 2n = 16  
 origin: Between Cromvoirt and Helvoirt (prov. of Noord-Brabant)

#### *Veronica catenata* Pennell

- coll. no.: G. et K. 4506 . . . . . 2n = 36  
 origin: Near Babberich (prov. of Gelderland)

#### *Veronica officinalis* L.

- coll. no.: G. et K. 3158 . . . . . 2n = 36  
 origin: Near duck decoy, Eastern part of the Isle of Schiermonnikoog (prov. of Friesland)

## Umbelliferae

*Peucedanum palustre* (L.) Moench

coll. no.: G. et K. 1757 . . . . . 2n = 22

origin: Grebbeberg near Rhenen (prov. of Utrecht)

coll. no.: G. et K. 2235 . . . . . 2n = 22

origin: Between Emmen and Sleen (prov. of Drenthe)

## NOTES ON SOME SPECIES

a. *Alisma lanceolatum* With.

POGAN (1961, 1962) made an extensive study of some *Alisma* species. She arrived at the conclusion that *Alisma lanceolatum* is a tetraploid species, whereas *Alisma plantago-aquatica* is diploid ( $2n=14$ ).

At the tetraploid level plants with  $2n=24$  (Roumania),  $2n=26$  (Austria, Portugal, France, Poland and Denmark) and  $2n=28$  (Great Britain, Sweden, Finland, Denmark) occur (see POGAN, 1961, 1962, for further references). The Dutch material agrees in chromosome number with the plants originating from Roumania.

b. *Atriplex hastata* L.

In one plant, originating from the Isle of Schiermonnikoog, it was not possible to establish the exact chromosome number. In roottips of the same plant two polyploid series proved to occur:  $2n=18, 36$ ;  $2n=32, 64$ .

c. *Koeleria albescens* DC.

This species was not yet investigated cytologically before. As the basic number of the genus *Koeleria* is  $X=7$ , *K. albescens* is a diploid species ( $2n=14$ ).

d. *Lysimachia vulgaris* L.

LEVITSKY (in TISCHLER, 1937) counted  $2n=28$ . The origin of his material is unknown. GADELLA and KLIPHUIS (1963, 1966) found  $2n=56$  in plants originating from Terschelling and Vorne (Quakjeswater near Rockanje). In 1965 many plants were collected in 16 different places. The chromosome number of these plants was not easy to determine, but in well-fixed metaphase-plates the chromosome number  $2n=84$  could be established in all investigated plants. Plants with the number  $2n=56$  were not found again, so the number  $2n=84$  seems to be the more common in the Netherlands. The number  $2n=84$  is only known in one other species of the genus *Lysimachia*: *Lysimachia debilis* Wallich (studied by HARA and KUROSAWA, 1965).

e. *Pedicularis sylvatica* L.

Up till now ca. 20 species of the genus *Pedicularis* have been studied cytologically, 19 of which proved to be diploid ( $2n=16$ ) and one tetraploid,

$2n=32$  (*Pedicularis sceptrum-carolinum* L., studied by SOKOLOVSKAJA and STRELKOVA, 1960). LÖVE and LÖVE (1944) found for *P. sylvatica*:  $2n=16$  (plants originating from Lappland). The Dutch plants, collected near Nieuw-Milligen, proved to be tetraploid,  $2n=32$ .

f. *Phyteuma spicatum* L.

*P. spicatum* and *P. nigrum* are very closely related in morphological respect and are both characterized by the chromosome number  $2n=22$  (SKALINSKA *et al.*, 1964; OCHLEWSKA, 1965; GADELLA, 1966; POLATSCHEK, 1966). In Poland, OCHLEWSKA (l.c.) studied some populations more in detail and found that in many plants B-chromosomes occur. In 103 plants were counted the following numbers:  $2n=22$ :  $39 \times$ ;  $2n=23$ :  $21 \times$ ;  $2n=24$ :  $38 \times$ ;  $2n=25$ :  $4 \times$ ;  $2n=26$ :  $1 \times$ . In addition to 22 medium-sized-chromosomes 1, 2, 3, or 4 much smaller B-chromosomes were present. The same phenomenon was observed in a plant originating from Ulvenhout:  $2n=22+2B$ .

The number  $2n=36$ , counted by ARMAND (1912) could not be confirmed and is very probably erroneous.

#### SUMMARY

The chromosome numbers of 86 species of *Angiospermae* occurring in the Netherlands are reported.

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#### REFERENCES

- ARMAND, L., C. r. Acad. Scie. Paris, 55, 1534-1536 (1912).  
 BLACKBURN, K. B. and J. K. MORTON, New Phytol., 56, 344-351 (1957).  
 CASTRO, D. DE and M. NORONHA-WAGNER, Genetica Iberica, 3, 75-82 (1950).  
 CAVE, M. S. *et al.*, Index to Plant Chromosome Numbers for 1961-1964. Chapel Hill, North Carolina.  
 CONTANDRIOPOULOS, J., Recherches sur la flore endémique de la Corse et sur ses origines. Thèse Montpellier (1962).  
 EHRENDORFER, F., Österr. Bot. Zeitschr., 109, 276-343 (1962).

- ERLANDSSON, S., *Svensk Bot. Tidskr.*, **40**, 427-435 (1946).
- GADELLA, TH. W. J., *Proc. Roy. Neth. Acad. Scie., Ser. C* **69**, 502-521 (1966).
- and E. KLIPHUIS, *Acta Bot. Neerl.*, **12**, 195-230 (1963).
- and ———, *Proc. Roy. Neth. Acad. Scie., Ser. C* **69**, 541-556 (1966).
- and ———, *Proc. Roy. Neth. Acad. Scie., Ser. C* **70**, 7-20 (1967).
- HAGERUP, O., *Bot. Tidskr.*, **45**, 385-395 (1941).
- , *Hereditas*, **30**, 152-160 (1944).
- HARA, H. and S. KUROSAWA, *Journ. Jap. Bot.*, **40**, 36-40 (1965).
- KACHIDZE, N., *Planta*, **7**, 482-502 (1929).
- LÖVE, A. and D. LÖVE, *Arkiv Bot.*, **31**, 2, 1-22 (1944).
- and ———, *Icel. Univ. Inst. Appl. Scie. Dept. Agr. Rep.*, **B3**, 1-131 (1948).
- and ———, *Acta Hort. Gotob.*, **20**, 65-290 (1956).
- and ———, *Opera Botanica (Lund)*, **5**, 1-581 (1961).
- OCHLEWSKA, M., *Acta Biol. Cracov.*, **8**, 135-145 (1965).
- ORNDUFF, R., *Regnum Vegetabile*, **50**, 1-128 (1967).
- PETERSON, D., *Bot. Not.*, 1936, 281-419 (1936).
- POGAN, E., *Acta Soc. Bot. Polon.*, **30**, 667-717 (1961).
- , *Acta Biol. Cracov. Ser. Bot.*, **5**, 1-28 (1962).
- POLATSCHEK, A., *Österr. Bot. Zeitschr.*, **113**, 101-147 (1966).
- POLYA, L., *Acta Geobot. Hung.*, **6**, 124-137 (1949).
- PRIESTLEY, C. A., *Bot. Soc. Brit. Isles, Yearb.*, 1953, 63 (1953).
- ROHWEDER, H., *Bot. Centralbl. Beih.*, **59 B**, 1-58 (1939).
- SOKOLOVSKAJA, A. P. and O. S. STRELKOVA, *Bot. Zhurn.*, **45**, 369-381 (1960).
- SORSA, V., *Ann. Acad. Scie. Fenn., Ser. A* **58**, 3-14 (1962).
- TARNAVSCHI, I. T., *Bull. Jard. Mus. Bot. Univ. Cluj*, **28** suppl., 1-130 (1948).
- TISCHLER, G., *Tab. Biol.*, **12**, 57-115 (1937).
- TSCHERMAK-WOESS, E., *Österr. Bot. Zeitschr.*, **95**, 270-276 (1948).
- WULFF, H. D., *Ber. Deutsch. Bot. Ges.*, **56**, 247-254 (1938).