SOME NOTES ON THE HYBRID BETWEEN CAMPANULA ISOPHYLLA MOR. AND C. PYRAMIDALIS L.

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SUMMARY

The hybrid (2n = 33) between *Campanula isophylla* (2n = 32) and *C. pyramidalis* (2n = 34) is described. Some notes are given on the relationship between both species.

1. INTRODUCTION

Hybrids between species of the genus *Campanula* are rare, not only in nature but also in gardens. This indicates that strong interspecific reproductive barriers are present in this genus, most species of which are strictly or predominantly allogamous.

GADELLA (1964, 1967) published the results of hybridization experiments between some species of the genus. Many interspecific crosses were unsuccesful, whereas in other cases some F-1 plants could be obtained, which did not come into flower. Only in a very few instances the hybrids produced some flowers, e.g. the hybrid (2n = 32) between *Campanula trachelium* (2n = 34) and *C. glomerata* (2n = 30), but usually they turned out to be completely sterile.

The junior author (G.) obtained 14 seeds by crossing the allopatric species *C. pyramidalis* (♀) and *C. isophylla* (♂). These seeds germinated and produced some small and weak seedlings with yellowish-green leaves. None of these hybrids reached the flowering state and all seedlings died within a few weeks. The senior author (M.) repeated this interspecific cross and obtained some F-1 plants that produced many flowers. In this paper the results of the latter crossing experiment are dealt with.

2. MATERIAL AND METHODS

The flowers of *C. isophylla* were emasculated. Access of insects was prevented by bags enveloping the flowers. When the stigmata of the emasculated flowers spread, the pollen of *C. pyramidalis* (from a just opening flower) was placed on the stigma of *C. isophylla.*

Roottips of the hybrid were used for cytological studies.

3. RESULTS

30 Seeds were obtained, 3 of which were able to germinate. One of the hybrids died, the remaining two reached the flowering state in 1971. In 1972 only one

hybrid was still alive and produced many flowers (fig. 1). Back-crosses of the hybrid to both parents were unsuccessful. The differences between the parents and the hybrid are described in the table. The chromosome number of the hybrid turned out to be 2n = 33.

Table

	♀ parent *C. isophylla*	hybrid	♂ parent *C. pyramidalis*
habit	prostrate-ascending up to 15 cm	1971: erect, ± 20 cm tall 1972: prostrate	1st year: rosette 2nd year: erect, up to 150 cm
diameter of stem	up to 3 mm	up to 5 mm	more than 1 cm
stem-surface	not grooved	not grooved	grooved
shape of leaves	orbiculate-cordate middle stem-leaves largest	cordate-ovate 1971: basal leaves largest, up to 5 cm long 1972: leaves only present on side-branches, ca. 2½ cm long	rosette leaves usually absent at anthesis, up to 10 cm long, ovate-oblong cordate; stem leaves up to 7 cm long with cuneate base
colour of the leaves	green	green; veins yellowish-green	green
margin of leaves	serrate or dentate; teeth with small (or without) callose apex	serrate; teeth with callose apex	serrate; teeth with callose apex
corolla	diameter 25–30 mm; length of petals 15 mm; width of petal lobes 10–12 mm	diameter 31–37 mm; length of petals 15–22 mm; width of petal lobes 11–12 mm	diameter 30–40 mm; length of petals 20–25 mm; width of petal lobes 15 mm
calyx-lobes	lanceolate-triangular 5–7 mm long, ± 2 mm wide patent/erect after anthesis margin without teeth; some small hairs present	lanceolate 8–10 mm long, 1,5–2 mm wide reflexed after anthesis margin with one tooth on either side; glabrous	triangular 12–20 mm long, 2–3,5 mm wide reflexed after anthesis margin with some teeth on either side; glabrous
length of style	20–22 mm	17–20 mm	18–21 mm
inflores-cence	a many-flowered pendent umbel-like panicle	1st year: an ascending panicle 2nd year: a many-flowered pendent umbel-like panicle	a many-flowered loose pyramidal raceme
chromo-some number	2n = 32	2n = 33	2n = 34

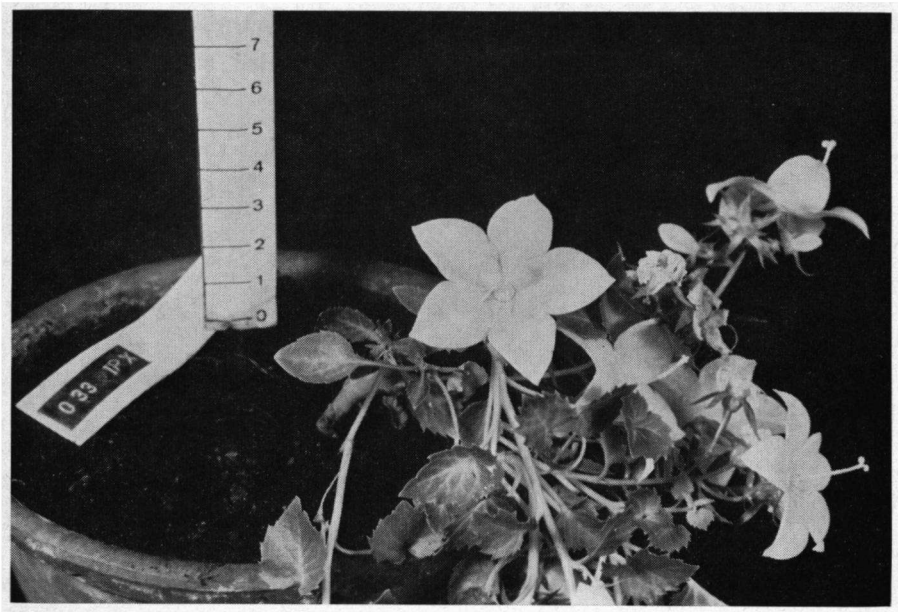

Fig. 1. The hybrid (2n = 33) between *C. pyramidalis* (2n = 34) and *C. isophylla* (2n = 32).

4. DISCUSSION

The hybrid did not produce viable seeds. This was to be expected, since most species of the isophyllae-group are not self-compatible (DAMBOLDT 1965). The pollen grains of the hybrid were partially normal, partially very small and empty. The fertility of the hybrid can be tested by crossing this plant with another artificially produced hybrid or by backcrossing to either parent. Backcrossing to the parental species did not result in the formation of viable seeds.

The chromosome number of the hybrid 2n = 33 is intermediate between that of *C. isophylla* (2n = 32, MERXMÜLLER & DAMBOLDT 1962; GADELLA 1964) and of *C. pyramidalis* (2n = 34, PODLECH & DAMBOLDT 1962; GADELLA 1964).

The hybrid is interesting both from a taxonomic and from an evolutionary point of view. Both parental species have erect capsules, those of *C. isophylla* dehiscing with a basal pore, those of *C. pyramidalis* with a medio-lateral pore. Both species have cordate leaves and small chromosomes (smaller than 2 micron). FIORI (1927) placed both species in the section *Elatines*. DAMBOLDT (1965), however, is of the opinion that this group is heterogeneous and excludes a number of species (among which *C. pyramidalis* and *C. versicolor*) from the group of isophyllous campanulae. Damboldt was able to demonstrate that in Fiori's section plants with n = 16 and n = 17 occur. Hybrids could not be produced between the plants belonging to the n = 16 and n = 17 group. The fact, however, that the senior author could obtain a vigorous hybrid by crossing *C. pyramidalis*

and *C. isophylla* shows that both species are very closely related and that a close connection between the chromosome numbers 2n = 32 and 2n = 34 must exist.

Perhaps both species have developed from the same ancestral stock. The number 2n = 32 of *C. isophylla* does not seem to be derived from x = 8 as is the case in such species as *C. persicifolia* (2n = 16), *C. latiloba* (2n = 16), and *C. stevenii* (2n = 32). These species share the following characters: lanceolate leaves, erect capsules with latero-apical pores, long chromosomes (4–6 micron). The number 2n = 32 may be the result of reduction of 2n = 34, but further research (i.a. a detailed study of the meiosis of the hybrid) is required to prove this hypothesis.

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