

한국 구절초의 세포분류학적 연구;

(1) 자연 잡종

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**A Cytotaxonomic study on *Chrysanthemum zawadskii* Herbich  
in Korea;**

(1) Natural hybridization

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**ABSTRACT**

This study was made on three taxa of *Chrysanthemum* that grew on the Ewha Womans University campus on the basis of gross morphology, pollen epidermal patterns and chromosomes. The three taxa were recognized as *Chrysanthemum zawadskii* subsp. *zawadskii* var. *acutilobum* ( $2n=54$ ); *Chrysanthemum zawadskii* subsp. *latilobum* ( $2n=36$ ), and possible hybrid ( $2n=45$ ) between the two taxa in view of leaf morphology and chromosome number counts.

**INTRODUCTION**

Korean *Chrysanthemum* have been described by Nakai, Kitamura and Kitagawa since the early twentieth century. In 1935, N. Shimotomai and K. Hara reported 27 chromosome number in pollen mother cells from *Chrysanthemum* taxa collected in area of Kongju, Province of Chungnam. Professor Han Changyel (1965) reported chromosome number studies on some of the wild *Chrysanthemum*. Recently, cytotaxonomy of Japanese *Chrysanthemum* was studied by Shimotomai, Takahara and Shimiz (1961, 1921, 1961) and they reported 54 and 72 chromosome number in the somatic cells.

In order to shed some light on detailed and accurate cytotaxonomy of Korean species of wild *Chrysanthemum* the writer have conducted the investigation on the wild *Chrysanthemum* chromosomes since 1964 at Ewha Womans University campus where three wild types grow, with special interest in possible hybridization phenomena.

**MATERIALS AND METHODS**

*Chrysanthemum* materials that had been transplanted from the Ewha Womans University campus to the greenhouse in the Ewha Botanical Garden were used for the investigation. For cytological studies root tips were pretreated with 0.002 mol. hydro-oxyquinoline for 4 hours at room temperature, and the squashing method was employed with one percent acetic orcein solution.

Chromosomes were observed with the Olympus microscope at magnification of 1000 times.

### Observation

The three taxa of the plants were grown in the well lighted *Pinus densiflora* forest on reddish clay and corroded granite soils.

The leaves of the taxa present three types of gross morphology; the first taxon has broad and shallow lobed leaves, the third taxon has finely lobed leaves, and the second is more similar to the third, but it also shares some of the characteristics of the first taxon (Fig. 1).

Pollen grains were observed under the magnifications of both 100 and 1000 times. Pollen size and shape were not much different among the taxa, averaging 29 microns in the first, the second 30.5 and the third 30.6 using the longest diameter. At least ten pollens were measured for each taxon. The degree of the sterility for the three taxa was found to be 15.3% for the first taxon, 58% for the second and 10% for the third, with around 200 pollen counts for each taxon.

The epidermal patterns were not distinctly differentiated among three taxa. The stomata of the first taxon averaged 44 microns in length, and 29 microns in width; the second 46.2 microns in length, and 28.8 microns in width; and the third 42.3 microns in length, and 26 microns in width for ten measurements for each taxon.

The somatic chromosome number counts were found to be thirty-six for the plants of the first taxon, forty-five for the second, and the third fifty-four (Fig. 2).

(Table I)

Taxon	First taxon	Second taxon	Third taxon
Character			
Leaves	broad, shallowly lobed	rather finely lobed	finely lobed
Stomata	44 microns in length 29 microns in width	46.2 microns in length 28.8 microns in width	42.3 microns in length 26 microns in width
Pollen grains	29 microns in length	30.5 microns in length	30.6 microns in length
Sterility	15.3%	58.1%	10.1%
Chromosomes	2n=36	2n=45	2n=54

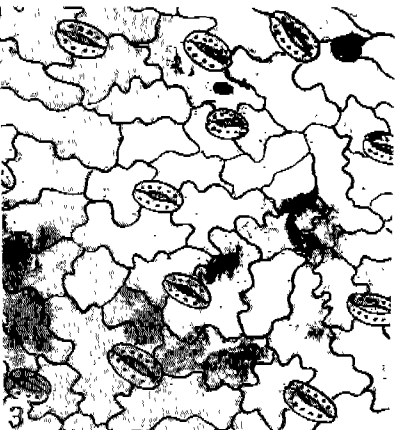
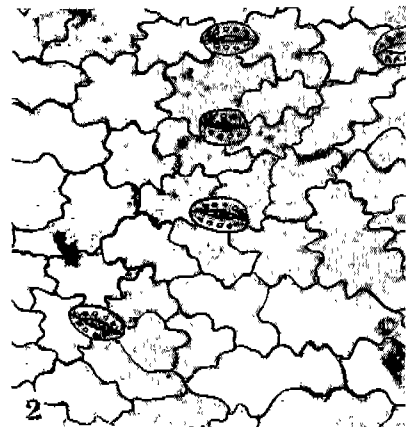
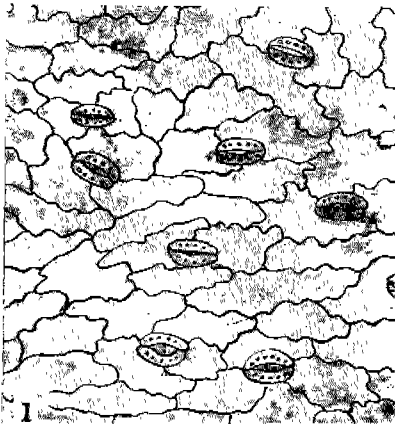
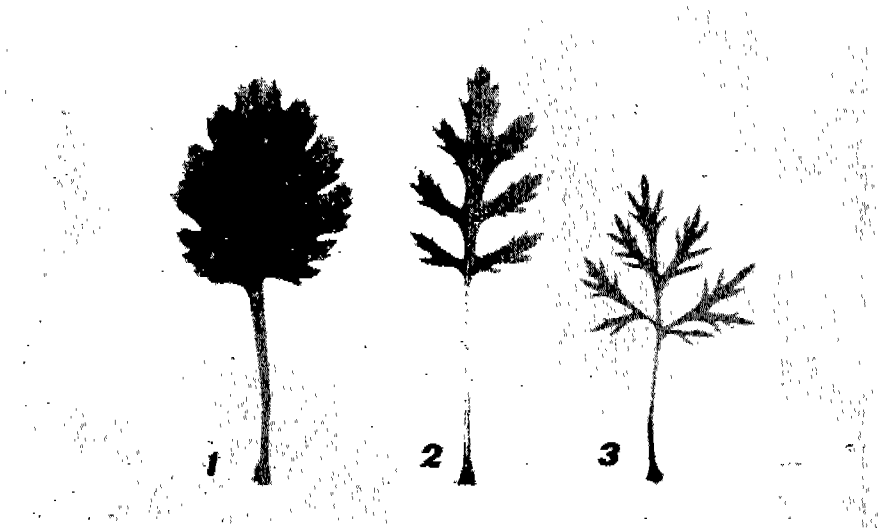
### DISCUSSION

The basic chromosome number of *Chrysanthemum* is 9 and the diploid chromosome number of 18, 36, 54, 72 and 90 are known.

The chromosome number of 45 is found in the plants from the second taxon of the present investigation seems to be the first case ever reported.

The *Chrysanthemum* belonging to the first taxon is found to be *Chrysanthemum zawadskii* Herbich subsp. *latilobum* (Max.) Kitagawa, and that of the thirds as *Chrysanthemum zawadskii* Herbich subsp. *zawadskii* var. *acutilobum* (Decandolle) Sealy. Though there is no significant difference in the characteristics of stomata, pollen grain sizes, and the degree of sterility among three taxa investigated. A definite differentiation in the leaf morphology and chromosome numbers is observed (Table 1).

The analysis of leaf characters and chromosome numbers of the three taxa seem to



Leaves and Epidermis

1. *Chrysanthemum zawadskii* subsp. *latilobum*
2. Possible hybrid
3. *Chrysanthemum zawadskii* subsp. *zawadskii* var. *acutilobum*



Somatic Chromosomes

1. *Chrysanthemum amadskii* subsp. *zawadskii* var. *acutilobum* ( $2n=54$ )
2. *Chrysanthemum zawadskii* subsp. *latilobum* ( $2n=36$ )
3. Possible hybrid ( $2n=45$ )

indicate a possible natural hybridization phenomena in *Chrysanthemum*. The plants of the second taxon show intermediate characters in leaf shape and in chromosome numbers of the first and third taxa.

It is interesting to note that the plants of the second taxon, possible hybrid, seem to show very vigorous growth as compared with the others. In order to check the possibility of the natural hybridization in the *Chrysanthemum* species studies further detailed meiotic behavior of chromosome in the pollen mother cells of the possible parents and the hybrid is to be investigated.

### 摘 要

구절초의 자연 잡종 현상에 관한 연구이다. 이화여자대학교 뒷산에서 길모양으로 세가지 다른 형으로 보여지는 구절초를 발견하여 심어 가꾸며 그 뿌리 염색체 수와 꽃가루 및 잎의 결점질 등을 조사하였다.

그 결과 잎이 넓은 것은 염색체 수가  $2n=36$  잎이 가늘고 찢어진 것은  $2n=54$ 였고 그 중간형의 잎을 나타내는 것은  $2n=45$  이었다. 염색체수, 잎의 형태 및 나고있는 장소 등으로 보아  $2n=45$  는  $2n=36$  과  $2n=54$  의 자연 잡종이 아닌가 생각된다. 또한 이 식물은 잡종강세 현상을 나타내고 있다.

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