Chromosome Number of Field Bindweed (*Convolvulus arvensis* L.)

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Introduction

Field bindweed (*Convolvulus arvensis* L.) is a prostrate or climbing perennial weed, native to Western Asia and Europe. It is widespread in the world and most troublesome in cereals in the temperate zone. This weed reproduces sexually and vegetatively by sprouting new shoots from a deep and extensive underground root system (Holm *et al.*, 1977 ; Weaver and Riley, 1982).

This species is polymorphic. Many biotypes and ecotypes were reported (Brown, 1946 ; Whitworth and Muzik, 1967 ; Kiss, 1973 ; Garcia-Baudin and Darmency, 1979). The chromosome number of this species has been reported as 2n=48 most commonly (Koul and Gohil, 1973 ; Stace, 1973 ; Love, 1974 ; Garcia-Baudin and Darmency, 1979), but there has also been reports of 2n=50 (Wolcott, 1937 ; Saad, 1967) and n=16 (Vij and Singh,1976).

In 1977, five biotypes of this weed were found on the railroad side of Lafayette, IN, U.S.A. These five biotypes are different in morphological characteristics and glyphosate [N-(phosphonomethyl) glycine] tolerance (DeGennaro and Weller, 1984ab).

In this study, the chromosome numbers of these biotypes were counted.

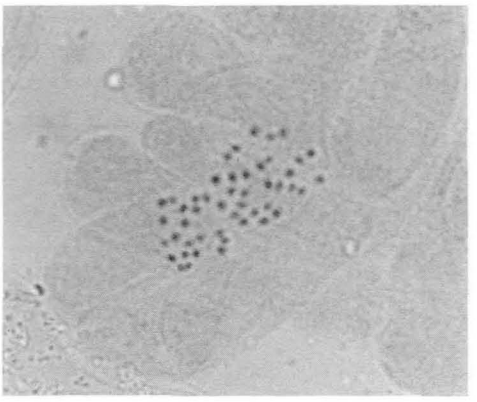
Materials and Methods

Five biotypes of field bindweed were collected from a railroad side population in Lafayette, IN, U.S.A. in 1977 and have been cultivated in a greenhouse of Department of Horticulture, Purdue University.

Somatic chromosome numbers from root tips were counted using the usual aceto-carmine squash method. The actively growing root tips were cut from the plants of five biotypes. These root tips were pretreated with 0.05% colchicine solution for three hours at 20 ℃ before fixing in a 45% acetic acid for 24 hours. They were hydrolyzed in a 2 : 1 (V/V) mixture of 1N HCl : 45% acetic acid at 60 ℃ for 15 sec. They were squashed and stained in aceto-carmine. Chromosome counts for each biotype were made at the metaphase stage.

Results and Discussions

The chromosome number 2n=48 was counted in the root tip cells of five biotypes and no differences in chromosome number were detected among five biotypes (Fig. 1). It was very difficult to compare structural differences of chromosome among five bi-



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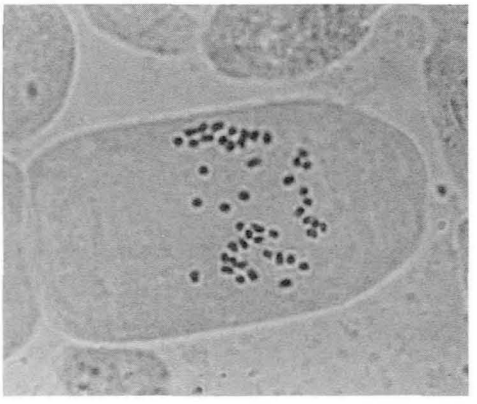

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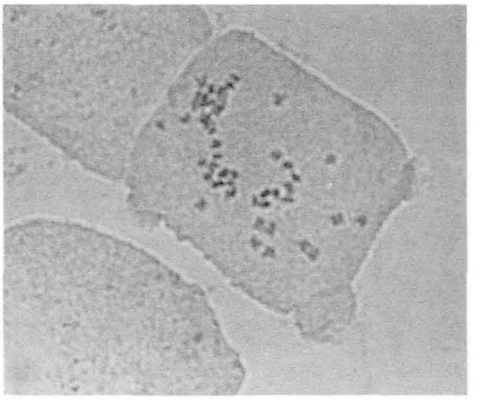

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Fig. 1. Somatic chromosomes of five biotypes of field bindweed
Numbers indicate biotype number.

otypes. The chromosome number 2n=48 agrees with those reported by Koul and Gohil (1973), Stace (1973), Love (1974) and Garcia-Baudin and Darmency (1979).

In some cells, aneuploidy and polyploidy were found (Fig. 2). This species propagates asexually by roots, so numerical and structural chromosomal alterations once produced in this weed can be preserved and perpetuated. These chromosomal mutation can be one of the reason for the occurrence of new biotypes. The chromosome number 2n=50 was reported by Wolcott (1937) and Saad (1967), and n=16 was counted by Vij and Singh (1976). These aneuploid and polyploid plants seem to be originated by such chromosomal mutation.

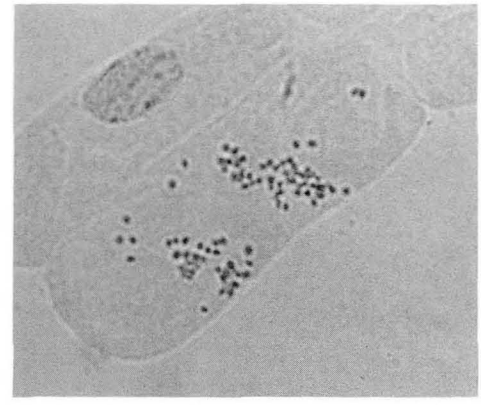

Fig. 2. Chromosomal mutation of field bindweed.

Chromosomal mutations, besides gene mutations, may cause the occurrence of polymorphism of field bindweed.

Abstract

The somatic chromosome numbers of five biotypes of field bindweed collected from a railroad side population were counted. The chromosome number 2n=48 was counted and there were no differences in chromosome number among five biotypes. In some cells, aneuploidy and polyploidy were found. Chromosomal mutations may be one of the reason for the occurrence of polymorphism in this species.

References

Brown, E. O. 1946, Notes on some variations in field bindweed (*Convolvulus arvensis* L.). Iowa State J. Sci. 20 : 269-276.

DeGennaro, F. P. and Weller, S. C. 1984a, Differential susceptibility of field bindweed (*Convolvulus arvensis* L.) biotypes to glyphosate. Weed Sci. 32 : 472-476.

DeGennaro, F. P. and Weller, S. C. 1984b, Growth and reproductive characteristics of field bindweed (*Convolvulus arvensis* L.) biotypes. Weed Sci. 32 : 525-528.

Garcia-Baudin, J. M. and Darmency, H. 1979, Differences intraspecifiques chez *Convolvulus arvensis* L. Weed Res. 19 : 219-224.

Holm, L. G., Plucknett, D. L., Pancho, J. V., and Herberger, J. P. 1977, *Convolvulus arvensis* L. "The World's Worst Weeds, Distribution and Biology" pp. 98-104. Univ. Press of Hawaii, Honolulu, Hawaii, U.S.A.

Kiss, A. 1973, Morphological variations and herbicide sensitivity of *Convolvulus arvensis* L. in the wine district of Mor. Acta Agron. Acad. Sci. Hung. 22 : 222-225.

Koul, A. K. and Gohil, R. N. 1973, Cytotaxonomical conspectus of the flora of Kashmir. (1) Chromosome numbers of some common plants. Phyton 15 : 57-66.

Love, A. 1974, IOTB chromosome number reports XLV. Taxon 23 : 619-624.

Saad, F. 1967, The *Convolvulus* species of the Canary Isles, the Mediterranean region and the Near and Middle East. Bronder-Offset, Rotterdam. 287pp.

Stace, C. A. 1973, Chromosome numbers in the British species of *Calystegia* and *Convolvulus*. Watsonia 9 : 363-367.

Vij, S. P. and Singh, S. 1976, Cytomorphological studies in Convolvulaceae. I. *Convolvulus* L. Cytologia 41 : 299-305.

Weaver, S. E. and Riley, W. R. 1982, The biology of Canadian weeds. 53. *Convolvulus arvensis* L. Can. J. Plant Sci. 62 : 461-472.

Whitworth, J. W. and Muzik, T. J. 1967, Differential response of selected clones of bindweed to 2,4-D. Weeds 15 : 275-280.

Wolcott, G. B. 1937, Chromosome numbers in the Convolvulaceae. Amer. Nat. 71 : 190-192.