STUDIES OF THE CHROMOSOMES OF *PLANTAGO*

III. CHROMOSOMES OF *PLANTAGO LANCEOLATA* L.

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The chromosome numbers of *Plantago lanceolata* L. have previously been reported by several authors (Nemec 1910, Nakajima 1930, McCullagh 1934 and Böcher 1940) as $2n=12$.

With reference to the chromosome morphology in this species, McCullagh (1934) have already reported. However, the present finding with the morphological details is not in accord with his results as shown in this paper.

In the present investigation, therefore, particular attention will be paid to the chromosome morphology in this species.

Material and Methods: The material for this study was collected at the foot of Mt. Hakodate near Hakodate city in Spring, 1953.

The root-tips were fixed with Navashin's, Flemming's and La Cour 2BE solution after 0.75 percent chloralhydrate pretreatment method. After the ordinary paraffin-section method, they were stained with Heidenhain iron alum haematoxylin. For the observation of the meiotic chromosomes the aceto-carmine smear method was employed.

Observations

A: Somatic divisions in root-tip cells.

The number of somatic chromosomes in root tip cells of this species was counted to be 12 as previous workers. These somatic chromosomes can be classified into five types by the relative position of constrictions and presence of satellite as characters in the present material.

I: Four chromosomes forming 2 pairs are characterized by having median constrictions, slightly different in length each other (Fig. 2, c-d).

II: Two chromosomes forming one pair bear submedian constrictions having distinctly dissimilar arms (Fig. 2, b).

III: Two chromosomes constituting one pair are characterized by having secondary constrictions with the short arms (Fig. 2, a).

IV: Two chromosomes forming one pair are the satellite chromosomes, being characterized by a secondary constriction. In comparing with the satellite in size, they seem to be somewhat different from each other (Fig. 2, e).

V: One of the remaining two chromosomes is the satellite chromosomes bearing primary constriction, and the other one have not satellite, but it have a seta at its distal end (Fig. 2, f). Consequently, these two chromosomes are heterotypic one's.

From the results of these observations, it was concluded that, the somatic complements of the present material are different from the one treated by McCullagh (1934), that is, a

new instance of chromosome behavior in this species.

Fig. 1. Somatic metaphase plates of root-tip cells. $\times 2500$. Fig. 2. Arrangement of somatic chromosomes from one complete metaphase plate. $\times 2500$.

B: Meiotic divisions in PMCs

Meiotic divisions in PMCs were found to proceed regularly; showing complete formation of 6 bivalents during meiosis and no univalent or multivalent were seen (Fig. 3, 4). These bivalents at first metaphase are almost equal size, showing no clear difference among them. This is more distinctly in second metaphase (Fig. 5).

The meiotic regularity in present material which have revealed the heterotypic chromosomes (Fig. 2, f) in the somatic complements may be genetical stability.

Summary

The present paper deals with the investigation of chromosomes in *Plantago lanceolata* L., finding the karyotype of the

Figs. 3-5. Meiotic figures in PMCs in *Plantago lanceolata* L. $\times 2500$. 3, polar view of IM, showing 6 bivalents. 4, side view of IM. 5, polar view of IIM, showing 6 univalents in each pole.

somatic chromosomes and chromosome behavior in meiotic divisions. Karyotypically the somatic complements of this plant consists of five kinds of chromosomes as shown Fig. 4. The meiotic divisions were observed; proceeding regularly.

Literature

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