Occurrence of B-Chromosome in Dichanthium Willemet.

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Received February 34, 1967

Introduction

Several investigators have reported the occurrence of accessory, supernumerary, or B-chromosomes in grass species. Carnahan and Hill (1961) in their recent review on cytology and genetics of grasses recorded about 50 species of grasses with accessory chromosomes. An account on the occurrence of B-chromosome in the genus Dichanthium Willemet, belonging to the tribe Andropogoneae is presented in this paper. Since none of the Dichanthium species were included in the list of Carnahan and Hill, the present report appears to be the first record on the occurrence of accessory chromosome in the genus Dichanthium. The accessory chromosome was found in one of the plants of F2 generation of the cross D. caricosum (2n=20) Linn. × D. aristatum (2n=20) (Poir) C.E. Hubb.

Techniques

For the study of somatic chromosomes, root tips were pre-treated for 40 minutes in alphabromonaphthalene and then fixed in acetic alcohol (3 alcohol: 1 acetic acid), hydrolised in 1N HCl for 15 minutes and squashed in 1% lacto propiono orcein (Dyer 1963). The pollen mother cell smears were prepared from the flower buds fixed in Carnoy’s fixative (6 alcohol:3 chloroform : 1 propionic acid) to which traces of iron acetate were added. The PMCs were first smeared in 1% propiono carmine and then destained with 45% propionic acid after introducing a drop of 1% lacto propiono orcein.

Cytological observations

Out of 30 plants from the F2 progenies investigated cytologically, 29 plants possessed 20 chromosomes, while one plant had 21 chromosomes in the cells. The additional chromosome was generally found in the meiocytes and in few somatic cells (Fig. 1). The extra chromosome was slightly smaller in size as compared to the rest of the chromosomes. It remained as univalent during diakinesis (Fig. 2) and metaphase-I (Fig. 3), lagged at anaphase-I. (Fig. 4,) and joined one of the telophase groups late in the division (Fig. 5 and 6). Occasional PMCs showed the presence of tripolar spindles (Fig. 5). During second anaphase also, the accessory chromosome was found as a...
laggard in one of the diad cells (Fig. 7) as it remained undivided, and later joined one of the telophase-II nuclei.

Discussion

Bosemark (1954, a, b; 1956 a, b; and 1957 a) attributed the origin of accessory chromosomes of *Festuca pratensis* to the possible fragmentation and struc-

Figs. 2-7. × 5-30. 2, diakinesis showing 10 bivalents + B. 3, metaphase-I with 10 bivalents + B. 4, lagging B chromosome during anaphase-I. 5, normal diad, and a triad resulted due to tripolar spindle + B. 6, B-chromosome joining the nucleus at late anaphase-I. 7, B-chromosome proceeding towards the upper pole in one of the diad cells during second anaphase.
tural rearrangements including deletion of euchromatic and duplication of heterochromatic segments. Markarian and Schulz-Schaeffer (1958) from their studies on *Alopecurus pratensis*, *Anthoxanthum odoratum*, and *Secale monatum* stated that structures resembling accessory chromosomes might arise due to the frequent breakage of secondary constrictions or tandem satellites. These authors questioned the occurrence of supernumerary chromosomes in the previous reports and stated that they might be due to the mechanical breakage of chromosomes. The accessory chromosome found in the *Dichanthium* plant was certainly not caused by any such mechanical breakage of satellites, since the body was many times bigger than the satellite. It might have therefore, originated due to any one of the causes listed by Bosemark.

Bosemark (1957 b) and Nath and Nielsen (1961) reported non-pairing between accessories and standard chromosomes. In the present case also, the pairing of normal chromosomes was not affected by the presence of B-chromosome, and in no instance the accessory was found attached to the normal chromosomes.

Effects of B-chromosomes on meiosis were reported by Mochizuki (1957) for *Aegilops mutica* in which the presence of a single B was associated with meiotic irregularities. Nielsen (1955) found nucleolar like globules, bridges, multiple anaphase chromosomal associations and collapse of microspores in the plants of *Bromus inermis* having B-chromosomes. The occasional tripolar spindle formation in the present case might be attributed to the presence of B-chromosome.

In most of the reported cases the B-chromosomes have been found to divide during meiosis although non-disjunction of B-chromosome at anaphase-I was also occasionally found. One such non-disjunction of B has been reported in maize by Blackwood (1956). In the present case also, in no instance the accessory was found to divide. It always went undivided to either of the poles during the first as well as second anaphase.

Acknowledgment

The junior author is grateful to the Council of Scientific and Industrial Research, New Delhi, for the award of a Junior Research Fellowship during the course of these investigations.

Literature Cited


