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IDENTIFICATION OF THE EXTRA CHROMOSOMES IN CERTAIN PRIMARY SIMPLE TRISOMICS OF PEARL MILLET IN CROSSES WITH CHROMOSOMAL TRANSLOCATION-TESTER-STOCKS

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The F_1 trisomics of the three primary simple trisomics crossed with a set of five translocation-tester-stocks of pearl millet were studied to identify the extra chromosomes. Chromosome configurations at metaphase I indicated either the homology or independence of the extra chromosome and translocated chromosomes. The extra chromosomes in the three trisomic types viz., *tiny*, *spindle* and *pseudo-normal* were identified to be 1, 5 and 7, respectively.

INTRODUCTION

Primary simple trisomics and chromosomal translocations rank among the most useful cytogenetic stocks. The mutual identification of the extra chromosomes of primary trisomics and translocated chromosomes facilitates the linkage studies and chromosome identification.

The set of seven primary trisomics from desynaptic mutants (Tyagi, 1976) and selfed progenies of primary trisomic interchange heterozygotes (Tyagi unpublished) and a set of translocation-tester-stocks (Singh & Tyagi, 1973; Tyagi, 1975*a*) have been characterized in an inbred line, I-55, of pearl millet, *Pennisetum typhoides* (Burm.) Stapf. and Hubb. ($2n=14$), thus making it possible to conduct cytological analysis for identifying the extra chromosomes of trisomics with translocation testers whose chromosomes have been identified in terms of the arabic numerals from 1 to 7.

Tyagi (1976) identified the extra chromosomes of four primary trisomic types viz., *dark-green*, *lax*, *slender* and *broad* as 2, 3, 4 and 6, respectively, by studying the meiosis of trisomic plants heterozygous for a translocation tester. The present communication reports the identification of the extra chromosomes involved in the remaining three trisomic types by observing metaphase I (M I) chromosome configurations of trisomic F_1 hybrids between the primary trisomics and a set of five translocation-tester-stocks.

MATERIALS AND METHODS

Three primary trisomics : *tiny*, *spindle* and *pseudo-normal*, used in this study were those isolated from the selfed progenies of primary trisomic interchange hetero-

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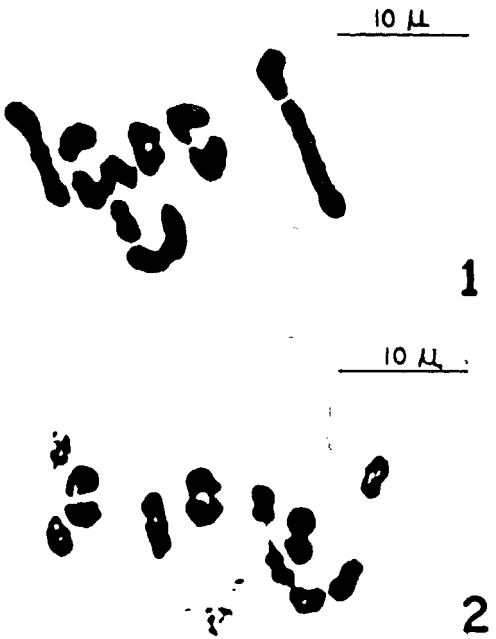
zygotes in an inbred line, I-55, of pearl millet. The identification of trisomics was based on the morphological characters as reported by Gill *et al.* (1970), who identified the extra chromosomes of these trisomic types, on the basis of somatic chromosome morphology, as 1, 5 and 7, respectively. The trisomic plants were used as female parents in each case and pollinated with a set of five translocation-tester-stocks viz., T 1–5, T 1–7, T 2–4, T 3–4 and T 3–7 (the numbers stand for the chromosomes involved in translocation) selected by Tyagi (1975a).

The trisomic plants in the F_1 hybrid populations were identified by somatic counts. Chromosome configurations at M I of trisomic F_1 hybrids were studied. Cytological preparations for root-tip and another squash techniques were the same as described earlier (Tyagi, 1975b, 1975c).

Observations and Discussion

By studying the chromosome configurations at M I in the trisomic F_1 hybrids between primary trisomics and translocation-tester-stocks, the extra chromosomes in primary trisomics are identified. Metaphase I chromosome configuration in microsporocytes of trisomic F_1 hybrids from primary trisomics X translocation-tester-stocks crosses and the chromosome identities by these means are given in Table I. Trisomic F_1 hybrid showing MI chromosome configuraion of 1 IV+1 III+4 II (Fig. 1) indicated that the extra chromosome of the trisomic type was



Figs. 1 and 2. Metaphase I chromosome associations in trisomic F_1 hybrids between primary simple trisomics and translocation-tester-stocks of *Pennisetum typhoides*. 1, Metaphase I association of 1 IV + 1 III + 4 II. 2, Metaphase I association of 1 V + 5 II.

TABLE I

Metaphase I chromosome configurations in trisomic F_1 hybrids between primary simple trisomic and translocation-tester-stocks of Pennisetum typhoides

Trisomic type	Translocation-tester-stock					Extra chromosome identification
	T 1-5	T 1-7	T 2-4	T 3-4	T 3-7	
Tiny	V	V	IV + III	IV + III	IV + III	1
Spindle	V	IV + III	IV + III	—	IV + III	5
Pseudonormal	IV + III	V	IV + III	IV + III	V	7

V : means association (1 V + 5 II)

IV + III : means independence (1 IV + 1 III + 4 II)

— : means no observation was made

independent of the translocated chromosomes in the tester stock. An association of 1 V+5 II (Fig. 2) indicated that the extra chromosome of the trisomic type was homologous with one of the translocated chromosomes in the tester stock.

Interpretations of the cytological observations follow:

Tiny : The trisomic F_1 hybrids with translocation testers T 2–4, T 3–4 and T 3–7 showed 1 IV+1 III+4 II, indicated that the extra chromosome of *tiny* was not 2, 3, 4 or 7. In contrast, the trisomic F_1 hybrids with T 1–5 and T 1–7 showed the chromosome configuration of 1 V+5 II. Since the common chromosome of these two translocation testers (T 1–5 and T 1–7) is 1, the extra chromosome of *tiny* is 1.

Spindle : In the trisomic F_1 hybrids with translocation testers T 1–7, T 2–4 and T 3–7, 1 IV+1 III+4 II was observed, which indicated that the extra chromosome of this trisomic type was not 1, 2, 3, 4 and 7. In the trisomic F_1 hybrids with T 1–5, a configuration of 1 V+5 II was seen. From this observation it is obvious that the extra chromosome of *spindle* is chromosome 5.

Pseudo-normal : The F_1 trisomics of *pseudo-normal* crossed with T 1–7 and T 3–7 translocation testers exhibited the chromosome configuration of 1 V+5 II, indicating that the extra chromosome of this trisomic type is homologous with one of the translocated chromosomes in each of these two translocation testers. The translocated chromosome common to both testers (*T* 1–7 and T 3–7) is 7, and hence the extra chromosome of *pseudo-normal* is 7, but not 1 or 3.

The extra chromosomes involved in the three primary simple trisomics : *tiny*, *spindle* and *pseudo-normal* of pearl millet were identified by cytological observations to be 1, 5 and 7, respectively. The results obtained in the present study are in agreement with those reported by Gill *et al.* (1970).

These and our earlier results (Tyagi, 1976) confirm the distinctness of the seven primary simple trisomic types and provide a mutual identification of the trisomics with the translocated chromosomes of the tester stock.

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