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ISOLATION OF TWO TRANSLOCATION HOMOZYGOTES IN MUNGBEAN (*VIGNA RADIATA* (L.) WILCZEK)

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ABSTRACT

Two translocation homozygotes were isolated in M_2 generation of two semisterile lines raised from seeds of mungbean variety NP 28 irradiated with interrupted 60 kR γ-rays. When crossed with marker standard type, one translocation homozygote produced semisterile hybrid showing a chain quadrivalent + 9 bivalents while the other translocation homozygote gave rise to semisterile hybrid with a ring quadrivalent + 9 bivalents. The translocation homozygotes, when intercrossed, produced highly sterile hybrid showing two quadrivalents (one chain, one ring) + 7 bivalents, indicating that the chromosome pairs involved in interchange in the two lines were different.

Key words: Mungbean, *Vigna radiata*, translocation homozygotes.

Translocation heterozygotes have been reported from M_1, M_2 and M_4 generations of mungbean (*Vigna radiata* (L.) Wilczek var. *radiata* Verdc.) following seed irradiation with 50 kR to 60 kR X-rays [1–3]. But homozygotes were not isolated in these cases. Isolation of two translocation homozygotes is reported in the present paper.

MATERIALS AND METHODS

The variety NP 28 was used for induction of translocations and the strain 4441. D1 was used as marker male parent for deep purple epicotyl character in crosses. Seeds of NP 28 were irradiated with γ-rays (60 kR dose with 2 fractions at 2 h interval) from the gamma source at Central Research Institute for Jute and Allied Fibres, Barrackpore. Pollen fertility was determined by aceto-carmine method. Flower buds were fixed in Carnoy's fluid with traces of ferric chloride and staining was done by the iron propiono-carmine method.

RESULTS AND DISCUSSION

M_2 GENERATION

In M_1 generation raised from γ-irradiated seeds, twelve semisterile (pollen sterility 50–65%) and four highly sterile plants (pollen sterility 73–93%) were isolated. One of these semisterile plants (SS-1) had 52% and another (SS-5) had 64.8% pollen sterility. SS-1 showed one chain quadrivalent during meiosis while SS-5 had one ring quadrivalent.

M_2 GENERATION

Four homozygous plants (pollen sterility 2–5%) in the progeny of SS-5 were crosses as female parent to the marker male parent line 4441. D1. Out of four hybrid lines, three had fully fertile plants and one had semifertile plants. One plant of this semifertile hybrid line was analysed in detail. It had 44.2% pollen fertility. The presence of one chain quadrivalent + 9 bivalents (Fig. 1: 1) in 25% of the cells at diakinesis and metaphase I (total cells analyzed 16) indicated the translocation homozygous nature of the female parent line. It was designated as THM-1.

Five homozygous plants (pollen sterility 2–5%) in the progeny of SS-1 were used as female parents in crosses with the marker line 4441. D1. Out of five hybrid lines, only one line had semisterile plants. One plant from this semisterile hybrid line had 46.8% pollen

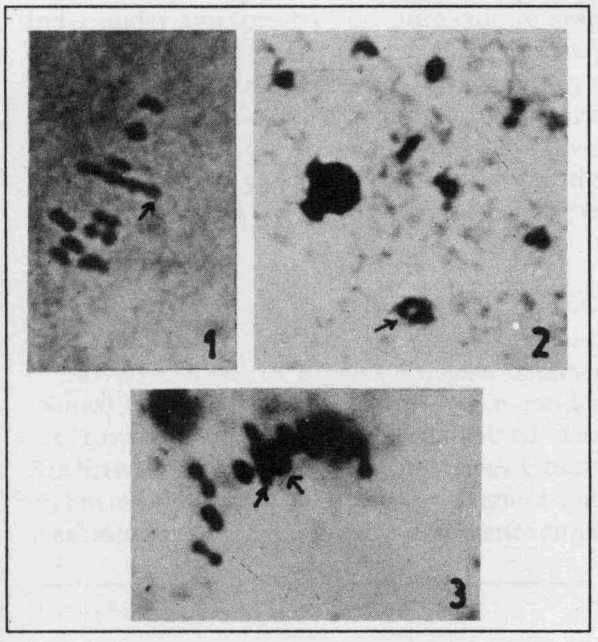

Fig. 1.
Chromosomal configuration at meiosis of translocation heterozygotes of mungbean.
1) One chain IV + 9II (x2200) at MI in the hybrid THM-1 x 4441. D1. Chain quadrivalent marked with arrow. 2) One ring IV at diakinesis (x2200) in the hybrid THM-2 x 4441.D1. Ring quadrivalent marked with arrow. 3) Two quadrivalents (one chain + one ring) + 7II at diakinesis (x1300) in F_1 of the cross THM-1 x THM-2. Quadrivalents marked with arrows.

sterility and showed 1 ring quadrivalent + 9 bivalents (Fig. 1: 2) in 26.6% cells (total 15 cells analysed). The female parent of that hybrid line was identified as translocation homozygote and was designated as THM-2.

HYBRID THM-1 x THM-2

One hybrid plant raised from the cross between THM-1 and THM-2 had 72.3% pollen sterility and showed 2 quadrivalents (1 chain + 1 ring) + 7 bivalents (Fig. 1: 3) in 23.8% cells (21 cells).

This analysis confirms that the chromosome pairs involved in the interchanges in two translocation homozygotes, THM-1 and THM-2, were different.

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