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### CYTOGENETICS OF A CRESCENT MUTANT OF RICE (*ORYZA SATIVA* L.)

In the  $F_2$  generation of a cross between two *indica* varieties, Taichung Native I (TNI) and MTU 3, a mutant has appeared. The mutant is characterised by dark green, erect, narrow leaves with incurved margins and the crescent shape of the spikelets. From  $F_1$  plants which were all normal 283  $F_2$  progeny plants were raised and out of these 25 plants (15:1?) showed the mutant traits (*viz.*, rolled leaf and crescent-shaped spikelets). These plants were numbered CR-1 to CR-25 and  $F_3$  populations were raised from these individual plants.

TNI is a short growing *indica* type grown in Taiwan and it has been introduced into India recently for some of its desirable agronomic characters. The other parent MTU 3, is a

locally cultivated strain which is fairly tall-growing with light green leaves. The  $F_1$  hybrid is medium-statured, with dark green leaves and the length of the earhead is intermediate between the two parents. The mutant has narrow, dark green leaves with the margins rolled in. The spikelets are crescent-shaped and deeply incurved (both lemma and palea being involved) uniformly in all the mutant plants. The characters of the parents and the hybrids are given in Table I.

Cytological study of the  $F_1$  plants and normal plants of  $F_2$  generation showed a regular formation of 12 bivalents and normal meiosis. In the 25 mutant plants studied, an association of four chromosomes at diakinesis and metaphase I was observed. These are translocation heterozygotes. The different types of association of four chromosomes at diakinesis are given in Table II. The frequency of rings was more than chains. About 58.5% of cells were showing an association of four chromosomes at diakinesis and 43.5% at metaphase I. No univalents and trivalents were observed either at diakinesis or metaphase I. The mean chiasma frequency per cell at diakinesis was 22.5 and at metaphase I 21.82. The second meiotic

TABLE I  
Characters of the parents, normal hybrid and the crescent mutant

Sl. No.	Characters	Parents		Hybrids	
		TNI	MTU 3	Normal $F_1$	Crescent mutant
1	Height of the plant (average) ..	70 cm.	125 cm.	100 cm.	100 cm.
2	No. of tillers per plant (average)	15-20	6-10	9-12	8-10
3	Leaf ..	Dark green, normal	Pale green, normal	Pale green to dark green, normal	Narrow, dark green, margins rolled in
4	No. of spikelets per earhead (average)	92	220	185	162
5	Shape of spikelets ..	Short, coarse	Medium, coarse	Medium, coarse	Curved markedly at the tip (crescent-shaped), medium

TABLE II  
Frequency of different types of the association of four chromosomes at diakinesis in the crescent mutant

Crescent mutant plant No.	Types of association of four chromosomes							Total No. of cells observed
CR-18 ..	60	14	6	4	2	..	4	99
CR-1 ..	8	4	2	..	..	..	4	16
CR-19 ..	5	6	3	2	1	3	..	20
Total ..	82	24	11	6	3	3	8	137

stages were normal. The high frequency of rings observed in cells with an association of four chromosomes and the alternate co-orientation of rings of 4 at metaphase I were all suggestive of the observed high pollen fertility (85.05%). The spikelet sterility (ovule abortion) ranged from 10% to 100% in the different mutant plants.

Backcrosses of the crescent mutant as female with its parents TNI and MTU 3 were unsuccessful perhaps due to incompatibility. How-

ever, the crosses with the crescent mutant as male have yielded a few seeds. The abnormal phenotypic characters rolled-leaf, and crescent-shaped spikelets were inherited as if they were a bloc. The plants bred true in  $F_3$  for the mutant characters.

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FIGS. 1-2. Fig. 1. Photograph of the crescent mutant with narrow, erect inrolled leaves and the crescent-shaped spikelets. Fig. 2. Photomicrograph of a diakinesis cell showing the association of four chromosomes indicated by an arrow, and ten bivalents.

### ANALYSIS OF THE KARYOTYPE OF *TURNERA ULMIFOLIA* LINN.

GHOSH (1960) working on the chromosome numbers of some dicotyledonous plants has reported the chromosome number of *Turnera ulmifolia* Linn., as  $n = 15$  and  $2n = 30$ . He worked on material collected from Calcutta area. Raman and Kesavan (1964) isolated a wild population of *Turnera ulmifolia* var. *elegans* from Coimbatore area in South India and reported the somatic chromosome number as determined from leaf tip cells as  $n = 10$  and  $2n = 20$ . Darlington and Wylie (1955) have not recorded the chromosome number of *Turnera*.

The present investigation was undertaken to make a detailed study of the somatic chromosomes of this taxon which is available in and around Bangalore (S. India). It has become wild in certain open and dry localities and flowers and fruits almost throughout the year. The capsules contain innumerable small seeds.

Seeds from mature capsules were germinated in petri-dishes under cold treatment. Young excised root tips were subjected to pretreatment with colchicine (0.05%) at room temperature and with 8-hydroxyquinoline (0.002 Mol.) at about 10° C. and squashed in 2% acetic orcein. Considerable difficulty was experienced in getting good preparations suitable for the study of the morphology of the somatic chromosomes. The chromosomes became either too much condensed or incompletely condensed. This difficulty was however overcome with certain modifications and control during pretreatment and staining.

The somatic chromosome number as determined from the root tip cells is found to be  $2n = 30$  in this taxon. The somatic complement consists of relatively small chromosomes without marked difference in their lengths. It has