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OCCURRENCE OF PENTASOMIC AND HEXASOMIC PLANTS IN WILD POPULATION OF *COIX GIGANTEA*

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CHROMOSOMAL deviation from the normal, resulting in nullisomics ($2n$-2) on the minus side and double trisomics ($2n$+1+1) and tetrasomics ($2n$+2) on the plus side have been reported in several plants[1]. Further reduction and/or increase in the chromosome number in individuals possessing less than $2n$-2 *i.e.* $2n$-3, $2n$-4 etc.) or more than $2n$+2 (*i. e.* $2n$+3, ($2n$+4 etc.) are extremely rare situations and occur only *exceptionally, if at all. Higher polysomics involving* sex chromosomes have been reported so far only in human abortuses[2]. However, in a population of *Coix gigantea* ($2n$=20), a pentasomic ($2n$+3, *i. e.* $2n$=23) and a hexasomic ($2n$+4, *i. e.* $2n$ = 24) plant have been isolated and are being reported here for the first time. In addition, several other common aneuploids were also isolated from this population.

Plants of *C. gigantea*(tribe Maydeae, family Poaceae) were collected from a wild population growing in the Western Ghats the mountain ranges on the west coast of Peninsular India. Single plant cytological study was carried out in the plants of this population which on preliminary screening was suspected to comprise of a mixture of cytotypes. Young male racemes were fixed in acetic-alcohol (1:3), mordanted with ferric chloride and the anthers were squashed in acetocarmine (1%). Squashes were made permanent using the liquid carbon dioxide freezing technique[3] and the slides were deposited in the Cytogenetics Unit of this Department.

C. gigantea occurs in two cytological forms, $2n$ = 20 and $2n$ = 40[4-7]. The present population comprises plants mostly with $2n$ = 20 chromosomes. Among a total of 96 chromosomal variants screened from this population, the various aneuploids appeared as: 68 nullisomics ($2n$ = 18), 13 monosomics ($2n$ = 19), 12 trisomics ($2n$ = 21) and one each a tetrasomic ($2n$ = 22), pentasomic ($2n$ = 23) and hexasomic ($2n$=24). Chromosomal variants in *C. gigantea* from $2n$ = 18 to 22 have been reported earlier by Venkateswarlu *et al*[8]. However, the pentasomic and hexasomic plants are being reported for the first time in the plants in general, and particularly in the genus *Coix*.

The five homologous chromosomes in the pentasomic plant formed a pentavalent (in addition to other nine bivalents) in the majority of PMCs at diakinesis (figure 1). The other chromosomal configuration

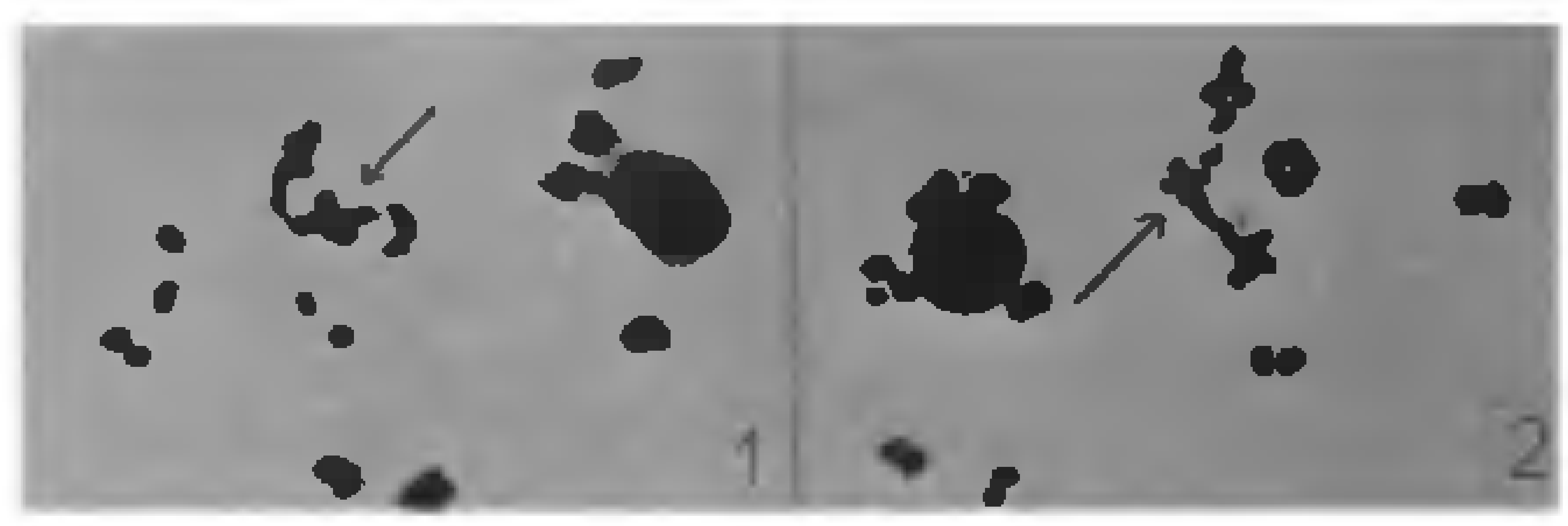

Figure 1&2 1 -Diakinesis in a pentasomic showing V+7 II+4I. **2**- Diakinesis in a hexasomic showing VI+9II.

(Note: Arrow in each, points pentavalent and hexavalent respectively. Magnification - × 3,000)

involving the five homologous chromosomes appeared as: III + II, IV+I, and II+II+I in decreasing frequency (table 1). Similarly, the six homologous chromosomes in the hexasomic plant formed a hexavalent in most of the PMCs at diakinesis (figure 2). The other associations involving the six homologous chromosomes appeared as: IV+II, 2II+2I, III+II+I, 3II, III+III, V+I, III+3I, II+4I and IV+2I in decreasing order (table 2).

TABLE 1

Chromosomal valency involving five homologues at diakinesis in a pentasomic plant.

Total number of PMCs scored	V	III + II	IV+I	II+II+I
248	122	68	38	30

Generally, reduction or addition of chromosome(s) to the diploid constitution leads to weaker aneuploid

TABLE 2

Chromosomal valency involving six homologues at diakinasis in a hexasomic plant

Total number of PMCs scored	VI	IV+II	2II+2I	III+II +I	3II	III+III	V+I	III + 3I	II + 4I	IV + 2I
380	93	63	54	46	43	27	18	15	12	9

individuals[1] with reduced pollen and ovule viability. A tetra-trisomic ($2n+2+1$) plant of *Pennisetum americanum* (L.) K. Schum was isolated with $2n=17$ ($2n+3$) chromosomes from among the progeny of open pollinated triploids[9]. The three extra chromosomes in the majority of PMCs were reported to give quadrivalent and trivalent configuration proving its tetra-trisomic nature. Because of the three extra chromosomes in the complement, this plant showed highly reduced vigour and fertility. However, all the different chromosomal variants in *Coix* both on the minus side as also on the plus side of diploids isolated in the present study were quite healthy except the pentasomic and the hexasomic. Pentasomic and hexasomic plants were stunted, had mutilated male racemes and showed no seed setting. Pentasomic plant showed about 18% stainable pollen, although the property to stain might not be an indication of viability. Hexasomic plant showed nearly all crumpled and unstained pollen.

Although the origin of the polysomics in *C. gigantea* would be a matter of guess, cytological studies carried out in this laboratory led to the inference that they arose through fusion of gametes produced by the trisomics. The meiotic analysis of trisomics ($2n=21$) showed quite a few 9–12 and 10–11 anaphase-I and metaphase-II distribution of chromosomes due either to non-disjunction of the trivalent or its segregation as II-I. Chance mating of gametes both with 12 chromosomes would produce hexasomic plant ($2n=24$) and fusion of gametes with 12 and 11 chromosomes would result in a pentasomic ($2n=23$). The tetrasomic plant ($2n=22$) could also be the potential source of aneuploid superhaploid gametes but compared to trisomics, tetrasomics are rare in the present population. *Coix*, although basically an open pollinated plant, shows some amount of selfing on account of the number of influorescences bearing male and female flowers at various stages of development on the same plant and at the same time. In all probability, therefore, both the selfed and crossed progeny in the trisomes produced these higher polysomics.

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DIURNAL RHYTHMICITY IN TOTAL PROTEIN AND COPPER CONTENTS OF THE BLOOD OF THE FRESHWATER FIELD CRAB, *OZIOTELPHUSA SENEX SENEX* (FABRICIUS)

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CONSIDERABLE work has been done on the activity rhythms in arthropods, including crustaceans[1]. Bar-