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Title: Double hypoploid of *Allium tuberosum*Rottl. ex Spreng. (2n = 4x = 30): its origin and cytology

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Abstract

Aneuploids provide valuable tools for locating genes on specific chromosomes and for studying dosage effect of additional/missing chromosomes. Presently, a double hypoploid with 2n = 4x = 30 chromosomes was found for the first time among the seed progeny of a tetraploid plant growing in Jammu University Botanical Garden. These chromosomes on the basis of form/size formed six quadruples and two triplets, with six groups having single deviant chromosomes. Occurrence of single deviant members in most of the groups pointed towards the segmental allotetraploid nature of present strain. Like the normal tetraploids, most of the pollen mother cells (PMCs) of this variant had somatic number of chromosomes (2n = 30) present as univalents or multivalents and bivalents, a few cells had double the somatic number of chromosomes (2n = 60) which were always present as bivalents. Meiotic details in the PMCs with 30 chromosomes revealed that 15.21 % cells had 30 univalents, 10.86 % cells had 6IV + 2III and in 54.32 % cells had configurations as 6IV + 2II + 2I, 4IV + 3III + 2II + 1I, 3IV + 2III + 5II + 2I, 2IV + 2III + 8II. Presence of a few cells with 6IV + 2III and most of cells with lesser number of quadrivalents but more bi- and univalents as well as the fact that 30 chromosomes matched into six quadruples and two triplets with most of the groups having single deviant members indicates that the present variant represents segmental allotetraploid.

Abstract

At the same time, occurrence of few cells with penta-/hexavalents indicates the involvement of structural chromosomal alterations in the evolution of present cytotype. In order to identify the missing chromosomes, present karyotype has been compared with that of its tetraploid parent. This comparison indicated that the missing chromosomes of the former belong to groups VII and VIII.For having some clues regarding the origin of present strain, reduction division in the two tracks of its progenitor was also studied. In the female track, majority of embryo-sac mother cells (EMCs) of the parent plant had 64 chromosomes which were present as 32 bivalents at metaphase I, with clean 32:32 segregations at anaphase I whereas a few EMCs available with 32 chromosomes had multivalents and unequal segregations in half of the cells with this number at anaphase I. In the male track, majority of the PMCs with 32 chromosomes had either multivalents or univalents at metaphase I and unequal dis junctional patterns in 32 % of the cells. As EMCs with 32:32 segregations are expected to develop into embryo-sacs with eggs having 32 chromosomes and PMCs and EMCs with 32 chromosomes and unequal separation of chromosomes are more likely to form genetically imbalanced gametes, it seems that the present variant has originated by the formation and the fusion of aneuploid reduced gametes.

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