THE ORIGIN OF TERTIARY MONOSOMICS IN THE TOMATO 1)

M. S. RAMANNA 2)
Department of Genetics, Agricultural University, Wageningen, The Netherlands
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Six aneuploid tomato plants with \(2n-1 = 23\) chromosomes were observed in populations grown from the seedlings treated with thermal neutrons and from seeds treated with X-rays. Four of the aneuploids were tertiary monosomics in which, as a result of centromeric interchanges between two different chromosomes, two whole arms were missing from the complement and two arms connected at the centromere. In one aneuploid, as a result of centromeric breakage, the two short arms of a homologous pair were missing from the complement and the two long arms connected to the long arm and the short arm respectively of another chromosome in which breakage had occurred also at the centromere. In one aneuploid, the interchange has occurred in the arms, and not in the centromere. Here the aneuploid condition is due to the loss of an arm with a centromere and a short piece of the other arm.

In most of the tertiary monosomics the missing arms were either the short arms of sub-metacentric chromosomes or any of the arms of meta-centric chromosomes. However, in one case the long arms of two sub-metacentric chromosomes were lost from the complement. That in spite of such large chromosomal deletions the sporophyte can survive, may be due to the fact that the aberrant plants are mostly chimeras.

Introduction

KHUSH & RICK (1966) have reported on the origin, identification and cytogenetic behaviour of tertiary monosomics in tomato. Tertiary monosomics have been defined by these authors as “Monosomics that possess a translocated chromosome but lack the reciprocal element, i.e. one arm of two different chromosomes of the complement”. Out of the eighteen tertiary monosomics they reported, one originated spontaneously in an \(X_2\) progeny and all the rest of them were induced by X-ray treatment of tomato pollen grains. Notable features re-

1) This study was part of a project resulting from a contract between the Association Euratom-I.T.A.L., and the Agricultural University of Wageningen.
2) Present address: Department of Plant Breeding, Agricultural University, Wageningen, The Netherlands.
Regarding these monosomics were that, 1. interchanges always occurred at the centromeres of two different chromosomes, and 2. whole arm losses occurred only in fifteen of the twenty-four arms of the complement.

In none of these cases the sporophyte was found to be deficient for one of the remaining nine (long) arms of the complement.

During the course of cytological investigation of irradiated diploid tomato populations, six aneuploids (2n-1 = 23) were encountered by the present author. Some of them proved to be tertiary monosomics of the type described by Khush & Rick (1966), whereas the others turned out to be different in some respects. The cytology of these aneuploids is described and the origin of tertiary monosomics is discussed in this article.

**Material and Method**

Aneuploids, with 2n-1 = 23, were obtained during cytological investigation of two types of population of the tomato, *Lycopersicon esculentum*, var. Moneymaker.

1. In 1966, about 200 shoot cuttings from individual tomato plants, which had previously been irradiated at seedling stage with thermal neutrons, were obtained from R. B. Contant. Details of the radiation treatment have been described by Contant & Verkerk (1967). The shoots were rooted in wet sand for two weeks in a moist growth chamber and subsequently they were planted in the greenhouse for further growth.

2. In 1967, dry tomato seeds (moisture content 8–9%) were irradiated with 5000r X-rays. About 150 plants were grown in the greenhouse. All the aneuploid plants recovered from the above population were maintained by vegetative propagation of shoot cuttings as described above.

Chromosomes were counted during meiotic prophase and metaphase I stages. Cytological technique and method of identification of pachytene chromosomes were according to Ramanna & Prakken (1967).

**Terminology**

Each aneuploid is indicated by its chromosomal constitution. Thus, for example, "haplo-1S-6S" indicates the aneuploid in which the