

FIGS. 1-3. Tapetal cells showing 24, 96 and 336 chromosomes with magnifications of $\times 780$, $\times 960$, $\times 960$, respectively.

developing microsporocytes through the disintegration of these cells and formation of tapetal periplasmodium. Maheswari⁷ also held the same view. The

family Asteraceae (Compositae), to which the safflower plant belongs, however, shows endopolyploid nuclei only rarely¹⁰. Here the phenomenon has been observed only in two species so far and that too in tissues other than tapetum^{1,11}.

Thus, the present observation of tapetal endopolyploidy in four safflower cultivars (namely Anigeri-I, Star 143-20, Talwada Local, and Berhampore Local) is significant showing different levels of endopolyploid conditions. The presence of 24, 96 and 336 chromosomes in different tapetal cells (Figs. 1-3) indicates the ploidy level of $2n$, $8n$ and $28n$, respectively. Besides, the tissue also includes cells with nuclei of different size gradients, perhaps concealing other levels of ploidy. The occurrence of as high as $28n$ level of ploidy in such a tissue substantiates their role in pollen development. This is perhaps the first report of tapetal endopolyploidy not only in safflower but in the family Asteraceae as a whole¹⁰.

The authors are thankful to Prof. D. N. De of this Department for encouragement.

August 2, 1980.

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IN VIVO PRODUCTION OF DIHAPLOID *SORGHUM BICOLOR* (L.) MOENCH

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In *Sorghum bicolor* (L.) Moench, the occurrence and mechanism of apomixis has been intensively studied by Rao and Murty and their colleagues⁵⁻¹². These studies reveal that apomixis in sorghum has been

brought about through a combination of (1) apospory, (2) diplospory and even through (3) a post-meiotic restitution in the embryo sac. Murty *et al.*⁹ indicated that the existence of synkaryogenesis¹²: fusion of haploid nuclei of the embryo sac before pollination also may result in the production of $2n$ embryo sacs. This phenomenon should virtually result in the production of dihaploid individuals. The present study was taken up to find out the possibility of obtaining such individuals in the progeny of crosses involving the apomictic line, R-473, as one of the parents.

The apomictic line, R-473, was crossed as a male to three other sorghum lines, IS-84, Kafir-B and White Seed. The F_1 's were uniform, indicating homozygosity of all the parental lines. The F_2 's segregated normally. The F_3 rows were of two types: type 1 was made up of normal segregants, and type 2 was made up of two groups of individuals, one group identical to the parent and the other made up of segregants. Individual plants among the type 2 plants were carried over to F_4 . Three types of progenies were obtained, (1) some segregating normally, (2) some identical to type 2 F_3 progenies and (3) some completely and remarkably uniform. The markers used for judging uniformity are plant height, number of days taken for flowering, awn length, compactness of the panicle, grain colour, shape, etc.

The last type of progenies were suspected to be true homozygotes derived through the post-meiotic

apomictic mechanism, synkaryogenesis. Their homozygosity was tested by crossing them to a pure line, white seed and observing the F_1 . The F_1 was uniform. The remnant seed of the parental F_2 and F_3 lines of these F_4 was grown and examined cytologically. The F_2 had multiple embryo sacs, persistent and prominent antipodals, meristematic nucellus and occasional synkaryogenesis (Fig. 1). This behaviour is exactly similar to that of R-473⁹. The F_3 , however, had the usual embryological behaviour normally found in sexual lines⁹.

It is concluded that the reproductive behaviour of R-473 has been transferred to F_2 's. These F_2 's are heterozygotes and reproduced partly through apospory and partly through synkaryogenesis. Individuals derived from the former will be similar to their parent and the latter will be completely homozygous. This is because in a sexual embryo sac, all the nuclei are genetically identical having originated through mitosis from a reduced megaspore. Fusion of two such nuclei results in a homozygote that is for all practical purposes a dihaploid. It is unlikely that this 100% homozygosity has been reached through two generations of selfing, since the populations raised were very small and the parents are genetically divergent. These studies are now being extended to several other crosses to isolate agronomically desirable types.

The authors are thankful to ICAR for supporting this investigation in their scheme of creation of professorial chairs.

August 4, 1980.

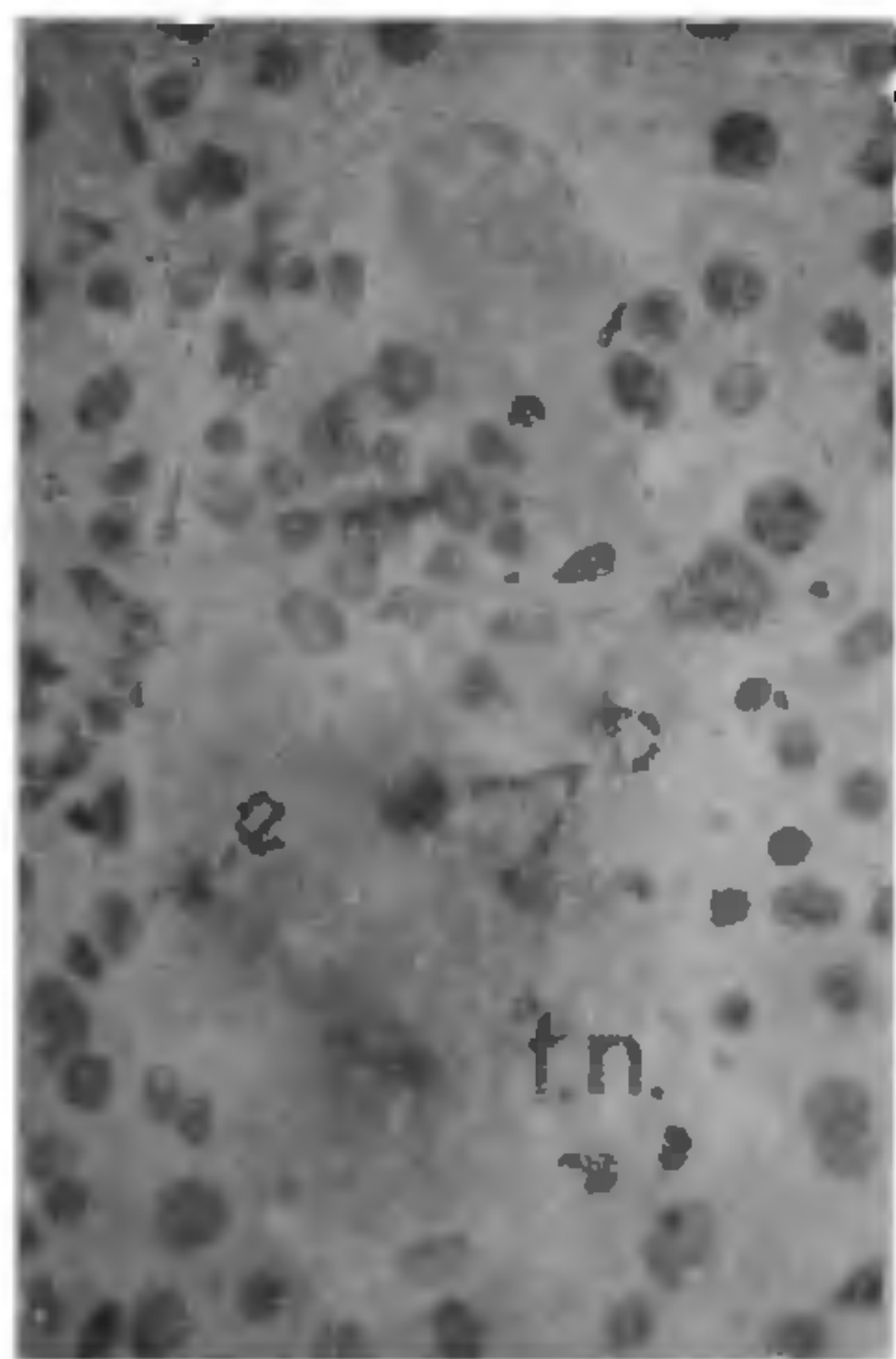


FIG. 1. Fusion of 2 nuclei of the egg apparatus in an embryo sac of an F_2 plant. (p, polar nuclei; fn, fusing nuclei of the egg apparatus; e, third cell of the egg apparatus).

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