

in acidic pH, rapid at neutral and extremely rapid at alkaline pH. The high loss (12–25% in 4 days) of vitamin C may be due to high pH (6.8) of the mushroom sap. Loss of vitamin C in citrus fruits (pH 3–4) has been found to be less than in potatoes (pH 6)<sup>6</sup>. Increased rate of conversion of ascorbic acid to dehydroascorbic acid at higher temperature may be due to the increased activity of ascorbic acid oxidase and other oxidases. Oxidases, particularly polyphenol oxidase (E.C.1.10.3.1), are very active in white button mushroom and its activity increases with increase in storage temperature<sup>8,9</sup>. It is known that quinones, the products of the enzymatic oxidation of phenols by phenol oxidase, cause non-enzymatic oxidation of ascorbic acid and this reaction has even been used in the spectrophotometric assay of phenol oxidase<sup>7</sup>. Increased loss of vitamin C at higher temperatures may be due to the high level of DHA available for the conversion to DKA. Slow loss of vitamin C in oranges and grapes has been observed at 5.5°C but the loss increased at higher storage temperature<sup>9</sup>. The vitamin C in mushrooms was best preserved at 5°C.

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## A NOTE ON SPONTANEOUS MIXOPOID IN *CAPSICUM*

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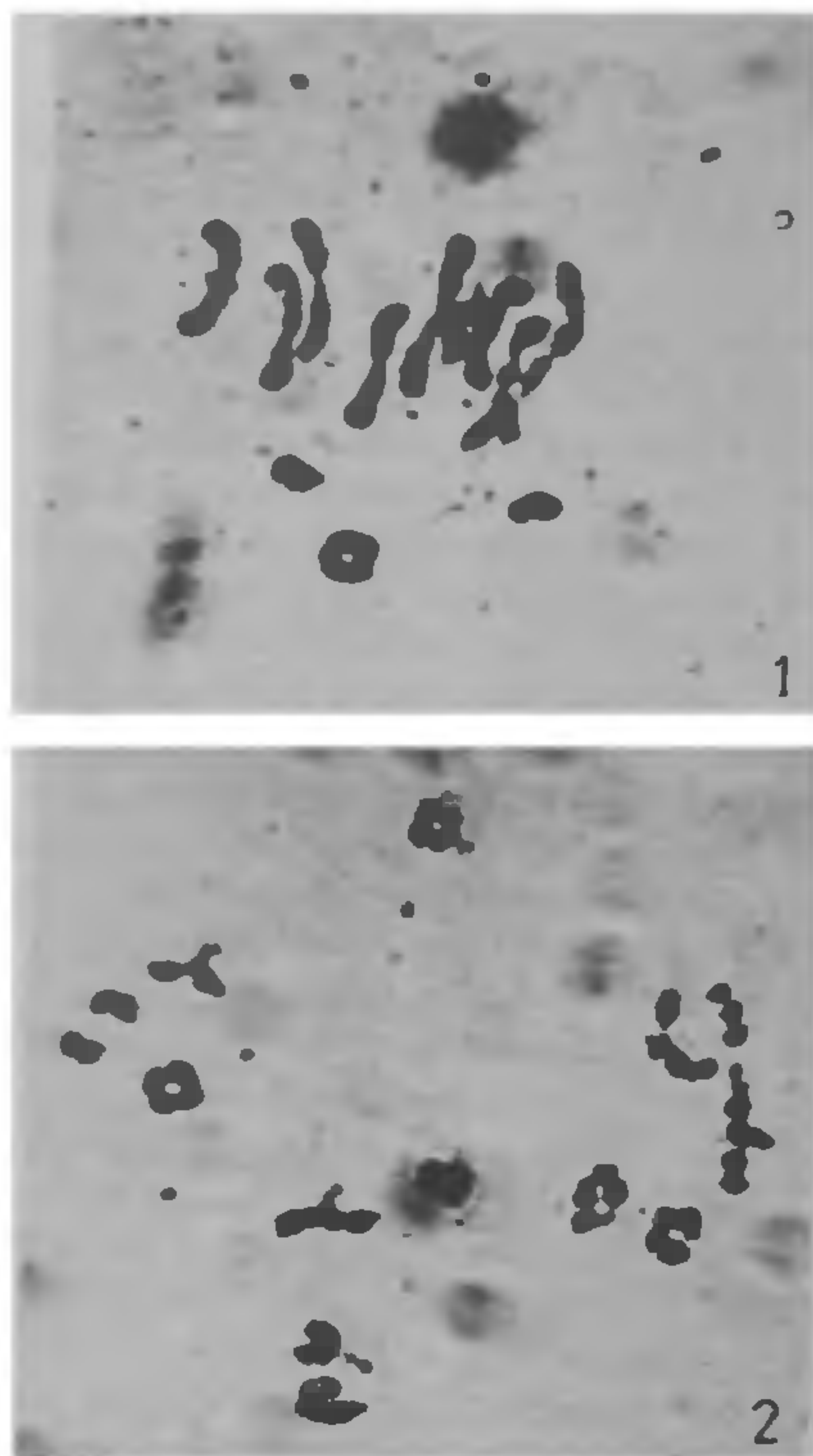
MIXOPOIDY is a condition in which the tissue is composed of cells with different ploidy levels. The origin of mixoploids may either be spontaneous or induced. However, their spontaneous occurrence is a rather uncommon phenomenon. A perusal of the existing literature revealed that in majority of the cases mixoploidy was confined mostly to somatic tissues<sup>1,2</sup> although there are a few reports of its occurrence in germinal cells<sup>3</sup>. Hitherto mixoploids were not on record in the genus *Capsicum*. The present paper reports for the first time the occurrence of a spontaneous mixoploid *Capsicum* and documents its cytomorphological details.

A semisterile variant was located in LCA 250, a cultivar of *C. annum*. Meiotic studies were made following acetocarmine squash technique. Morphologically the variant plant showed normal growth with good height (82.5 cm) and spread (112 cm). Leaves were small when compared to the diploid progenitor. Further it was characterized by its semisterile nature with very low fruit set. Pollen sterility was moderate (58%) with marked pollen polymorphism.

Meiotic studies revealed that the PMCs with diploid (figure 1) and tetraploid (figure 2) chromosome numbers were intermixed, the frequency of which was 64.7% and 35.2% respectively. In diploid cells the rod bivalents occurred in a greater frequency over the rings. Chromosome associations such as quadrivalents and trivalents ranging from 5 to 8 and 0 to 2 per cell respectively were noticed in the tetraploid cells (figure 2). The chiasma frequency per cell was quite low in diploid cells (13.58) in contrast to the good number of chiasmata per nucleus (38.5) in tetraploid cells. The post metaphase I meiotic stages were somewhat irregular with unequal anaphase segregations (8.25%), laggards (2.5%) and variable number of nuclear groups (6.4%) at telophase II.

Earlier investigators opined differently regarding the origin of mixoploidy and attributed it to the fusion of neighbouring cells prior to preleptotene<sup>4</sup>, assembling of chromosomes from different cells<sup>5</sup> and defective cell wall formation<sup>2</sup>. The presence of diploid and tetraploid PMCs in the same anther in the present study may be due to defective cell wall





Figures 1 and 2. 1. Metaphase I showing 11 II + 2 I ( $\times 2500$ ); 2. Diakinesis showing 8 IV + 2 III + 5 II ( $\times 1600$ ).

formation in premeiotic mitosis in some percentage of sporogenous cells. This leads to the formation of cells with two ploidy levels ( $2n, 4n$ ) which either undergo number of regular mitotic divisions prior to meiosis or directly act as pollen mother cells. The present report of spontaneous mixoploid in *capsicum* is of immense importance as it is capable of generating triploids and tetraploids in subsequent generations which in turn are valuable tools in cytogenetical research.

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## PLASTID MUTATIONS INDUCED IN RED PEPPER BY NITROSOMETHYL UREA

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EARLIER reports have shown that chlorophyll chimeras can readily be induced by the alkylating agent, ethylmethane sulphonate<sup>1-3</sup>. A high percentage of plastome mutations was obtained by Hosticka and Hanson<sup>4</sup> and Hagemann<sup>5</sup> using nitrosomethyl urea (NMU). Hagemann<sup>5-7</sup> described NMU as a potent mutagen for obtaining plastid mutations, an observation that is yet to receive much exploitation. This report describes the induction of a high frequency of chlorophyll chimeras in chilli by using mutagen NMU. Data are also presented on the inheritance of viable chlorina mutant.

The seeds of *Capsicum annum*, cv. Calwonder (CW) were soaked in distilled water for 24 h. Imbibed seed lots were incubated in 0.1 and 0.2% NMU (Sigma) several times (8, 16 and 24 h) or in distilled water as a control. Following the mutagen treatment, seeds were rinsed thoroughly in distilled water and sown in vermiculite in plastic pots which were subirrigated twice daily with a 1.2 g/l solution of Hyponex (7-6-19 by N:P:K: analysis, Hydroponics Chemical Co., Copley, OH) and grown in a controlled chamber under a 16-h-light/8-h-dark photoperiod (9:1 energy mixture of fluorescent and incandescent light at  $17.6 \text{ W. m}^{-2}$ ) at  $24^\circ\text{C}$ . Control and treated seeds were allowed to germinate in petri plates on moist filter paper underlined with cotton and germination counts were recorded on the 15th day. Numbers of chlorophyll chimeras and viable chlorina plants were determined after the first true leaves appeared.

Preliminary experiments revealed that NMU treatment caused much effect on the induction of chlorophyll chimeras. Variegation rates as high as 81% were obtained when the seeds were treated with 0.1% NMU for 24 h. NMU treatment at 0.2% was found to be lethal. The per cent seed germina-