TABLE 1

Effect of Hydroxylamine on Tomatillo (Physalis ixocarpa Brot.) in M_1.

Concentrations (Molar)	Germination (%)	Emergence (%)	Plant height (cms)	Aberrant plants
Control	95	89	31.7	nil
0.00				
0.06	70	65	32.5	mucronate apex, truncate apex
0.12	61	53	30.0	dumbbell shaped coty. leaf
0.25	45	35	15.5	rolled coty. leaf, obtuse, obcordate apex, two fruits at a node
0.5	35	29	14.0	fused coty. lamina, retuse apex, bifurcated mid vein and lamina

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CYTOMIXIS AND MEIOTIC ABNORMALITIES IN *JASMINUM* SPP.

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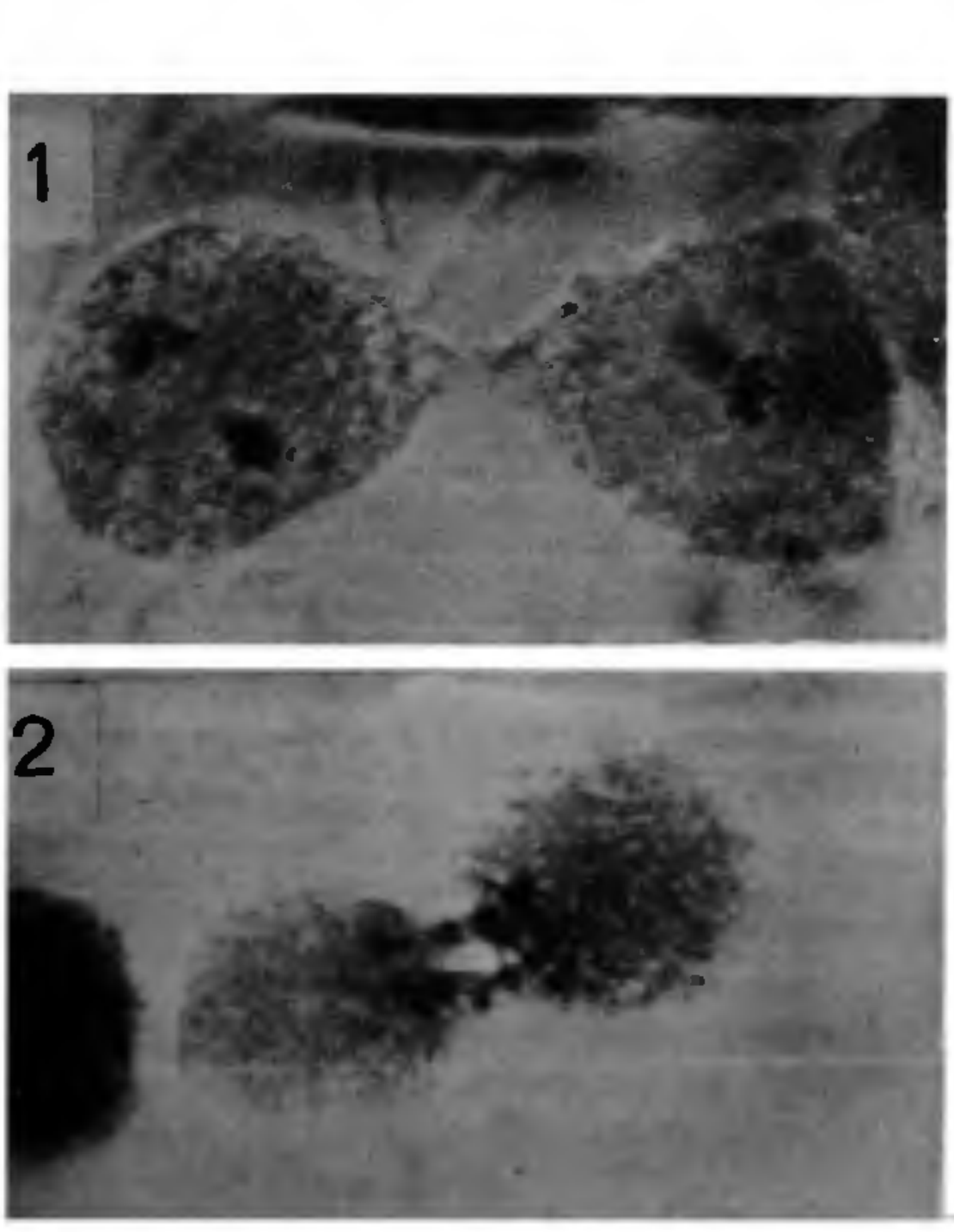
THE jasmines are highly domesticated ornamental plants grown for their fragrant flowers. They are propagated vegetatively because of poor seed set and improvement of quality through hybridization is difficult. Their pollen grains usually do not germinate *in vitro* or *in vivo*. In order to investigate the cause of sterility meiosis of the pollen mother cells is studied.

Five species of *Jasminum viz. Jasminum pubescens* Willd., *J. malabaricum* Wt., *J. grandiflorum* Linn., *J. angustifolium* Vahl. and *J. flexile* Vahl. were used for the study. Flower buds collected from gardens in different parts of South India were fixed at 10.30 a.m. in Carnoy's fluid (ethyl alcohol 3: glacial acetic acid 1: chloroform 1) and stored in 70% ethanol. Fixed anthers were smeared in lactopropionic orcein[1] with or without causing traumatic injury or extra pressure on anther sacs. Root tips pretreated with 8-hydroxyquinoline for 3 hr at 4° C and fixed at 4.30 p.m. were squashed in lactopropionic orcein[1]. Pollen fertility was determined by stainability in 2% acetocarmine. Pollen germination tests were conducted *in vivo* by dusting pollen grains on stigma at different times of the day and night and examined after 12 hr and *in vitro* by dusting pollen grains on Brewbaker's[2] or modified medium. Pollen germination was studied after and without staining.

Meiosis in most of the pollen mother cells was apparently normal until diakinesis. In some of the cells at diakinesis no stickiness among bivalents could be noticed. In subsequent stages in these cells and from prediakinesis stages in other cells the chromosomes were highly sticky and clumped. In anaphase they were either nonseparating or lagging and grouped in one lump or more. Also, partial or complete failure of cytokinesis was noticed in these aberrant meiocytes. After metaphase I massive cytoplasmic bridge with/without nuclear chromatin could be observed in 50–58% meiotic cells (figures 1 and 2). They appeared as if the chromosomes of one cell (donor) were passing into the neighbouring cell or cells (recepient). Cytomixis was observable at all stages of meiosis even in cases where great care was taken not to cause traumatic injury or extra pressure to anther sac while fixing and staining. This suggests that cytomixis is spontaneous and not an artefact[3,4]. Cytoplasmic connections with partial or total or no inclusion of nuclear chromatin in them were random as far as the meio-

cytes of any particular species were concerned. The channels were seen mostly between two or sometimes among more cells. The lagging or apparently migrating chromosomes of the so called donor and recepient cells were eroded, sticky and clumped although some of the chromosomes were well defined. Cytomictic connections with lagging chromatin in them were more frequent after anaphase I. This indicates that the apparent migration of nuclear matter was either starting or getting completed by these stages. Before metaphase I cytoplasmic connections were mostly without lagging chromatin as though division of chromosomes took place normally. However, wall formation between the pollen mother cells was incomplete in varying degrees. This suggests that cytomixis has its origin from premeiotic stages and it gets manifested increasingly in later meiotic stages. Appearance of whole chromatin in one cell leaving the adjacent cell empty was more frequent after anaphase II probably owing to increased inability to divide and separate into daughter cells. This resulted in empty, nonstainable, much smaller and sterile pollen grains. In all the plants investigated, even where a number of pollen grains were large, round and stainable, no germination was detectable *in vivo* or *in vitro* in Brewbaker's or modified media. One important observation during this investigation is the direct relation between cytomixis and pollen sterility. Although the magnitude of cytomixis and pollen sterility were varying among species there was direct correlation between these phenomena within individual species, that is, more the cytomixis more the sterility.



Figures 1 & 2.1. Partial failure of cytokinesis resulting in cytoplasmic bridge. 2. Cytomictic bridge with lagging chromatin in it. × 1500.

Since abnormalities appear regularly from early meiotic stages and cytomixis correspondingly occurs in later stages in the majority of cases, it is reasonable to assume that the meiotic abnormality is the cause of cytomixis and pollen sterility. This conclusion differs from earlier report[5]. Further, both meiotic abnormalities and cytomixis are regularly spontaneous and widespread in most of the species and appear to be originating from a peculiar gene action or a defective gene function bringing about a pathological condition in the cells. Owing to the defective gene function the chromosomes are unable to carry on the dreary processes of duplication and movement and lag in condensation and separation resulting in their clumping into unequal masses. Concurrently, incomplete cytokinesis and formation of wall between daughter cells would be forming cytoplasmic bridges which appear like extrusions of cytoplasm (with or without chromatin) as in what is called 'cytomixis'[6]. This kind of defective gene function causing abnormal meiosis, failure of cytokinesis appearing like cytoplasmic extrusions, sterility of pollen grains and absence of seedset may be a character accumulated through generations of domestication in these vegetatively propagated plants.

Mitosis in root tip cells is observed to be normal.

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