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EFFECT OF COLCHICINE ON SEX EXPRESSION AND LEAF SHAPE IN MULBERRY

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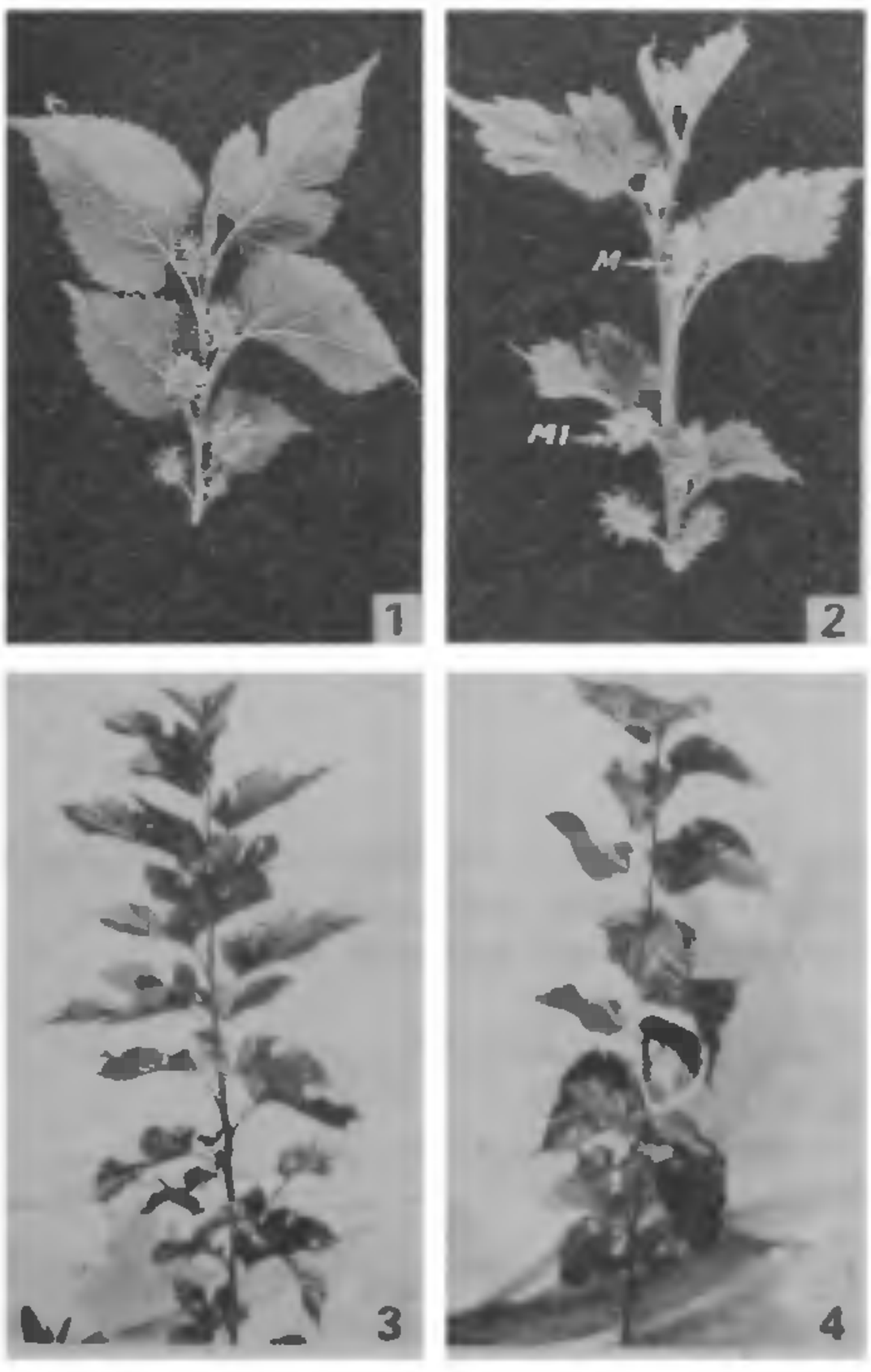
MULBERRY was the first plant through which the sex in plants was demonstrated[1]. The regulation of sex expression[2] and leaf shape was attributed to genetic, environmental and chemical factors in angiosperms. Modification of sex expression in mulberry (*Morus* spp.) was reported by several workers using growth regulators, certain ionic chemicals and colchicine[3–7]. The present paper deals with the sex modification and leaf shape in a female cultivar of mulberry, popularly cultivated in the rainfed areas of Karnataka with lobed leaves viz. Mysore Local (*Morus indica* L.) by colchicine. This is part of the polyploidy breeding programme designed to improve the nutritive quality of leaves by inducing tetraploidy subsequently evolving triploids by hybridization with different desirable diploid strains.

The sprouting vegetative buds of female mulberry cultivar Mysore Local were treated with 0.35% aqueous solution of colchicine (Loba, India) prepared in 5% glycerine for 6 h for three consecutive days, using cotton plugs to keep the growing buds moist in November–December 1985. After the treatment, the cotton plugs were removed and the buds washed with distilled water. There were four replications for 6 buds for treatment. The control received only distilled water treatment. The pollen fertility was determined in 1% acetocarmine.

Flowers were induced after 10–15 days in treated as well as in control. The control buds produced 100% healthy female inflorescences (figure 1), while the treated buds produced male, mixed type and female inflorescences (figure 2). The frequency of production of male (21%) and mixed type (27.25%) of inflorescences was lower than that of healthy female (50.75%) inflorescences. Higher frequency of production of male (43.27%) and mixed type (25.08%) of inflorescences than that of suppressed (23.08%) and healthy female inflorescences (7.69%) was reported in cultivar Kanva-2 (*Morus alba* L.) which was treated with 0.4% aqueous solution of colchicine[5]. There were a few bisexual flowers (3.5%) in the mixed type of inflorescences along with male (56.33%) and female (40.17%) flowers on the same inflorescence. Pollen fertility was 89.33% and 85.67% in male and mixed type of inflorescences respectively. Female inflorescences of control buds dusted with pollen grains of male and mixed type of inflorescences showed 83.87% and 66.67% seed setting respectively. After three months of treatment a branch bearing entire leaves (figure 4) was isolated from treated batch whereas the branches grown from control as well as other treated buds bore only lobed leaves (figure 3). The branch with entire, dark green and smooth



Figures 1–4. **1.** Control branch bearing female inflorescences; **2.** Induced male and mixed inflorescences; **3.** Control branch bearing lobed leaves, and **4.** Branch developed from treated bud bearing unlobed leaves. (M, Male inflorescence; MI, Mixed inflorescence).

leaves was multiplied for further investigations. The plants raised through cuttings of isolated branch bear entire leaves but normal female inflorescences.

The present investigation demonstrates that the induction of male sex and the appearance of entire leaves on female mulberry cultivar with lobed leaves are probably due to blocking of the action of ethylene wholly or partially and also due to the induction of somatic mutation by colchicine respectively. Further studies are in progress on these colchicine-induced entire leaf variants to conform mutagenic action of colchicine.

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DEVELOPMENTAL MORPHOLOGY OF THE MICRO AND MEGASPORANGIUM IN *CRYPTOLEPIS BUCHANANII* R. & S.

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THE family Periplocaceae[1] which consists of 50 genera and 200 species[2] is mostly tropical. The embryological investigations are scanty and cover only two genera namely *Cryptostegia*[3] and *Hemidesmus*[4]. Hence in the present investigation the developmental morphology of the micro and megasporangium in *Cryptolepis buchananii* R. & S. (a plant widely used in our native medicine) is reported.

The flowers are pentamerous and the anther is quadrisporangiate (figure 1A, B). The anther wall development is of the dicotyledonous type and at maturity consists of the epidermis, fibrous endothecium, middle layer and a glandular tapetum which is uniseriate with uninucleate cells (figure 1C–E). The primary sporogenous cells directly function as the pollen mother cells which undergo simultaneous meiotic divisions and produce tetrahedral, isobilateral and T-shaped tetrads (figure 1F–H). Cytokinesis is by cell plate formation. The nucleus of the young microspore divides twice and produces a large vegetative cell and two spindle-shaped sperms (figure 1I). Thus the pollen grains are 3-celled during liberation. Another interesting feature is the presence of pollen grains in tetrads even at the shedding stage.

The ovary is superior, bicarpellary syncarpous and bilocular with numerous ovules on axile placentation (figure 1K). The ovule is anatropous, unitegmic and tenuinucellate (figure 1L). The archesporium is hypodermal in origin and directly function as the megaspore mother cell without cutting of a parietal cell (figure 1M). The megaspore mother cell increases in size and undergoes two meiotic divisions successively and produce a linear tetrad of megaspores. The chalazal megaspore of the tetrad develops into an 8-nucleate embryo sac of the Polygonum type (figure 1N, O). The squamellae (figure 1J) are seen by the side of the ovary and alternating with the petals. The embryo sac is broader and cylindrical. The egg apparatus consists of an egg and two synergids (figure 1O). The synergids are flask-shaped. The fusion of the two polar nuclei takes place just before the fertilization. the antipodals are three in number and are uninucleate.

Rendle[5] divided the Asclepiadaceae into two subfamilies namely Periplocoideae and Cynanchoideae based on the morphological features like stamens (stalked or sessile), number of locules per anther, pollen and translator. Hutchinson raised the taxonomic hierarchy of the subfamily Periplocoideae to that of a family. However, the embryological studies in the taxa (including the present study) reveal that although there are some differences between the two subfamilies, the resemblance between them is so strong that their separation into two separate families is not justified. Similar conclusions were also drawn by Tiagi and Dixit[6] on the basis of vascular anatomical studies.

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