A Rare Abnormality in Male Inflorescence of Mulberry – A New Report

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The genus Morus L. to which all the cultivated and wild mulberry belong, was established by Carolus Linneaus, the Swedish botanist and taxonomist in the 1753. The mulberry is the first plant where sex was demonstrated by Rudolf James Camerer, a German worker better known by the Latinized name Camerarius (1964), rediscovered sexuality in plants. To date the mechanism of sex expression in mulberry is not understood fully. Mulberry plants are generally dioecious but occurrence of monoecious plants is sporadic. However, unisexuality is more predominant and some plants produce all types of flowers. According to Mendez (1998) the probability of reproduction and the number of inflorescences produced increased with the plant size and the flower number (Total male staminodes, female pistillodes) increased with both plant and inflorescence sizes. Bisexual flowers exist due to development of pistillode or staminodes (Mukherjee, 1963, 1965). The existence of different floral structures indicate that original flowers were probably hermaphroditic and unisexuality occurred from reduction/suppression on sterility of either stamens or pistils (Alieve, 1974, Goethe, 1970). Differences in sex expression in mulberry was earlier reported (Hardner, 1948). High temperature (28° – 35°C), long day and full day lights and C/N ration have favoured predominantly the female flower (Minamizawa, 1963, Jolly et. al., 1986). Physical injuries like pruning may also change the sex from male to female and vice versa. Various reports show that sex of particular species in mulberry is not a static phenomenon. It changes from season to season, depending upon fluctuations in environment, cultural practices, pruning and nutritional status of the soil. (Tikader et al., 1995)

Keywords: Mulberry, male inflorescence, abnormality

Metamorphosis of different floral organs have been reported by several authors. It was reported that all appendices of leafy shoot – leaves, bracts, sepals, petals, stamens and pistil are homologous (Goethe, 1970). Any floral organ and even the ovule, may become leafy in form or colour (Meyer, 1966). However, branching in male inflorescence is hitherto unknown. The present scientific communication reports the branching in male inflorescence in M. laevigata Wallich ex Brandis, a wild collection from Andaman and Nicobar Island, observed for the first time at Central Sericultural Germplasm Resources Center, Hosur, Tamil Nadu, India during normal flowering season in February, 2001, 2002 and 2003.

The male flower in mulberry attached to the peduncle is arranged compactly or loosely. The pedicel of each floret is very short attached with the stalk of the peduncle. The male flower consists of 4 perianth leaves. The perianth leaves are not persistent and after pollination or discharge of pollen they dry and fall off. The anther and stamen are attached to the stalk. However, the abnormal floral behaviour observed in M.
laevigata showed the branching of the catkin from one to three branches (Fig. 1). A total of 30 out of 300 male catkins were observed, showed branching (10.00%). The plant was allowed to grow into tree and after two years of establishment the abnormal behaviour of the catkin was observed. Other flower characters were also recorded (Table 1). Maximum inflorescence length recorded was 19.0 cm and minimum was at 6.0 cm. The characteristic feature of the species is lengthy catkin for both male and female. The plant is predominantly male but during characterization, the plant was pruned. In the field, a gene bank bisexual flower was observed along with male flower. But it is not a permanent feature; in due course of time the plant again produced male flower. The bisexual flower was produced after mechanical injury (pruning) to the plant and similar observation was earlier reported (Tikader e. al., 1995).

The causes of such abnormal behaviour in plants are known viz., the effect of mutagens which produce fasciations in buds, shoots, leaf parts, flower and fruits and favours new plant formation (Aliève, 1974). Abnormalities and modifications are also known to occur due to annual climatic conditions, available moisture and nutrients in soil, low stimulus for floral initiations and physiological activities (Meyer, 1966, Hardner, 1948).

The effects of environmental or chemical or physical processes on the production of stamens and pistil are particularly noticeable in dioecious or in monoecious plants with unisexual flowers distributed in some definite pattern but not as a rule. A particular gene only becomes active when the physiological situation favors its activity, changes induced by it in the reaction system, triggers the action of certain other genes for initiation/ modification of flowers (Wardlaw, 1957). Frequent sex reversal of mulberry holds the view that dioeciousness or unisexuality of Morus is not caused by hereditary differences but by physio-chemical or physiological condition, since both male and female individuals were potentially bisexuals. Multi-inflorescence showed a functional gender around 0.5, while plants with one inflorescence showed more extreme functional gender (either male, female or functionally sterile). Branching of inflorescence is in general rare and hitherto not reported in mulberry and branching of male inflorescence in M. laevigata is the first report in the genus Morus. The branching of male inflorescence is not accidental, it was observed in February 2001, 2002 and 2003 during

![Figure 1. Branching male inflorescence in mulberry; A=Normal, B=Abnormal.](image)

<table>
<thead>
<tr>
<th>SI No.</th>
<th>Characters</th>
<th>Seasonal mean value (Normal)</th>
<th>Seasonal mean value (Modified)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Inflorescence length (cm)</td>
<td>12.00</td>
<td>12.70</td>
</tr>
<tr>
<td>2.</td>
<td>Inflorescence breadth (cm)</td>
<td>0.75</td>
<td>0.78</td>
</tr>
<tr>
<td>3.</td>
<td>No. of floret per catkin</td>
<td>240.00</td>
<td>244.00</td>
</tr>
<tr>
<td>4.</td>
<td>No. of branch per catkin</td>
<td>----</td>
<td>1.00 – 3.00</td>
</tr>
<tr>
<td>5.</td>
<td>Inflorescence length (cm) (secondary &amp; tertiary)</td>
<td>----</td>
<td>3.38 – 4.00</td>
</tr>
<tr>
<td>6.</td>
<td>No. of floret per catkin (secondary &amp; tertiary)</td>
<td>----</td>
<td>77.50 – 80.00</td>
</tr>
<tr>
<td>7.</td>
<td>Inflorescence penducle length (cm)</td>
<td>1.00</td>
<td>1.16</td>
</tr>
<tr>
<td>8.</td>
<td>Pollen diameter (mm)</td>
<td>15.00</td>
<td>15.32</td>
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<tr>
<td>9.</td>
<td>Pollen viability %</td>
<td>92.00</td>
<td>90.00</td>
</tr>
</tbody>
</table>

Table 1. Inflorescence characters of M. laevigata (Normal and Modified).
the flowering season in 10 plants, which indicates that
the abnormal characteristic has some bearings. The
causes and significance of such branching of male
inflorescence is under further study.

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