Table 1  Cyto-morphological variation in Atyllosia species hybrid
(No. of PMCs studied were 30 for each plant)

<table>
<thead>
<tr>
<th>Plant (No.)</th>
<th>Average chromosomal association at metaphase-I</th>
<th>Pollen stain-ability (%)</th>
<th>No. of primary branch</th>
<th>No. of secondary branch</th>
<th>Growth habit</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. albicans (female parent)</td>
<td>11 II</td>
<td>99.1</td>
<td>20.5</td>
<td>49.5</td>
<td>Twining shrub</td>
</tr>
<tr>
<td>A. scarabaeoides (Pollen parent)</td>
<td>11 II</td>
<td>98.2</td>
<td>17.5</td>
<td>38.5</td>
<td>Semi erect—spreading</td>
</tr>
<tr>
<td>F$_1$ (A. albicans × A. scarabaeoides)</td>
<td>10 II + 2.0 I</td>
<td>53.7</td>
<td>18</td>
<td>52</td>
<td>Semi erect—twiner</td>
</tr>
<tr>
<td>F$_2$ (Segregants)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>10.6 II + 0.8 I</td>
<td>93.26</td>
<td>20</td>
<td>59</td>
<td>Semi erect coupled with broad leaves</td>
</tr>
<tr>
<td>13</td>
<td>7.5 II + 7 I</td>
<td>30.85</td>
<td>18</td>
<td>40</td>
<td>Erect with branch end drooping</td>
</tr>
<tr>
<td>14</td>
<td>8.5 II + 5 I</td>
<td>37.07</td>
<td>17</td>
<td>58</td>
<td>Spreading</td>
</tr>
<tr>
<td>15</td>
<td>9 II + 4 I</td>
<td>58.29</td>
<td>16</td>
<td>39</td>
<td>Erect</td>
</tr>
<tr>
<td>18</td>
<td>10.6 II + 0.8 I</td>
<td>67.41</td>
<td>22</td>
<td>65</td>
<td>Semi erect with profuse branching</td>
</tr>
</tbody>
</table>

albicands, the scope extends further in isolating/selecting some of the highly nutritive cultivar in F$_3$s and onward generation population. Variabilities in morphological characters arose several biological interests towards understanding the relationship between two species on the one hand and its potentials in breeding new plant types towards the improvement of Atyllosia scarabaeoides on the other.

3 April 1984


RESPONSES OF ISOLATED FLORAL BUDS AND ANTHERS OF ABUTILON INDICUM IN VITRO

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Cultured floral buds of several plants yield a callus capable of regenerating organs. It is also well-demonstrated that in anthers grown in vitro the callus originates from wall layers, connective tissue or from pollen grains. In many species, the pollen grains directly develop into plantlets. This report describes the in vitro responses of floral buds and anthers of Abutilon indicum Sweet. The twigs bearing flower buds were surface-sterilised in chlorine water for 5 to 10 min. After washing in sterile distilled water, buds and anthers were dissected out aseptically and implanted on Bourgin and Nitsch medium with 2% sucrose (BM) with various growth adjuvants. The pH of the medium was adjusted to 5.8 and the cultures were maintained in diffuse light (150 to 200 lux for ca 10 hr daily) at 25 ± 2°C and 50 to 60% relative humidity.

The flower buds at the uninucleate pollen grain stage, did not callus on BM or BM + coconut water (CW, 15%), or casein hydrolysate (CH, 500 ppm). On BM + IAA (1 ppm) 25% of the explants showed callusing in 2 weeks. In response to IAA (1 ppm) + CW (15%), sepals and cut end of the pedicel showed proliferation.
Figures 1–7. 1. Flower bud at culture (extreme left) and progressive stages in callus formation on BM + CW (15%) + IAA (1 ppm) × 2.6. 2. Six-week-old subcultures of callus with roots on BM + IAA (2 ppm) + kinetin (2 ppm) × 1.4. 3. Whole amount of anther after 2 weeks growth on BM + CW (15%) + 2,4-D (1 ppm). Note surface proliferation. × 126. 4. A portion of anther from a similar culture as above to show intact pollen grains. × 98. 5–7. Pre-globular, globular and elongated embryos respectively observed in the acetocarmine preparations of callus growing on BM + CW (15%) + 2,4-D (1 ppm). × 597, 575, 123.
in all the cultures within a week (figure 1). The callus was yellowish-white and friable; it failed to differentiate organs on subculture to the same medium. The responses were nearly similar when the buds were implanted on BM + CW (15%) + NAA/IBA/2,4-D (1 ppm). Squash preparations of portions of actively growing callus showed densely cytoplasmic cells with prominent nuclei. Generally, the cells were uninucleate but cells with 2 or 3 nuclei were also noted. In addition several multicellular structures and filaments of cells were noticed.

The subcultured callus exhibited unlimited growth on BM + IAA/NAA/kinetin (0.25, 0.5, 1, 2 or 5 ppm) but no organogenesis ensued. However, only rooting occurred on BM + IAA (0.5 ppm) + kinetin (0.5, 1 or 2 ppm); BM + IAA (2 ppm) + kinetin (2 ppm) (figure 2).

The anthers containing tetrads or uninucleate pollen grains when reared on BM and BM + CW (15%) or CH (500 ppm) or 2,4-D (1 ppm) senesced after 2 weeks. But on BM + CW (15%) + 2,4-D (1 ppm) the anthers swelled considerably within 2 weeks followed by proliferation from the wall layers (figure 3). In another week a profuse mass of yellowish-white, friable callus was formed and the pollen grains remain unchanged (figure 4). The callus proliferated in subculture but failed to undergo organogenesis on BM + IAA/2,4-D/kinetin (0.25 to 5 ppm), but rooted in all concentrations of NAA tried excepting at 5 ppm.

Squash preparations of callus developed on BM + CW (15%) + 2,4-D (1 ppm) showed pro-globular, globular and elongated embryos (figures 5–7) which failed to reach maturity.

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1. Nataraja, K., Phytomorphology, 1971, 21, 290.

CHEMOTAXONOMY OF PANDANUS AND TYPHA

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The present note is an attempt to adduce the affinity between the two genera, Pandanus and Typha on the basis of chemical evidence and the evidence from collateral disciplines and to see how far their segregation is justified.

Standard tests1 with the fresh material and ethanolic extracts of Pandanus odoratissimus Roxb. and Typha angustata Bory and Chaub showed the absence of anthraquinones, aucubin compounds, cyanogenic glycosides, hydroxy quinones, indoles, Juglone, lignans, methylene dioxy compounds, saponins, syringaldehyde and syringyl radicals and the presence of similar flavonoids, simple phenols, raphides, steroids, tannins and triterpenoids. The above results are in conformity with those of the few tests conducted by Gibbs1, who also recorded the presence of caffeic and p-coumaric acids in these two taxa. Pandanus, however, differs from Typha in the absence of catecholtannins and leucoanthocyanins, presence of alkaloids and positive results for the activity of the enzyme polyphenolase. Gibbs1 recorded the absence of such phenolic compounds as kaempferol, cyanidin, sinapic and ferulic acids in Pandanus and presence of the same in Typha.

Sparganium1 exhibits more similarities in chemical characters with Typha than with Pandanus (present study). Thus there seems to be a chemical homogeneity among these three taxa. Further the similarities in unisexual flowers, spicate inflorescence, reduced perianth, endospermic seeds, monosulcate pollen grains, vessel and chromosomal characteristics substantiate this view. Sharma2 had suggested their inclusion under one order Pandanales on cytological grounds. Thus though the totality of evidence and numerical assessment3 of the characters drawn from diverse disciplines such as anatomy4, chemotaxonomy1 (present study) cytology5, morphology6,7, and palynology8 lend support to the close kinship among the three genera and their retention under one Englerian9 taxon Pandanales and negate their segregation, a study of a large number of taxa is necessary.