**DIVERSITY OF AROIDS (ARACEAE) IN NAZIRA SUB - DIVISION, SIVASAGAR (ASSAM)**

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**ABSTRACT**

Present paper is an attempt to highlight the diversity of Aroids (Areaceae) found in Nazira Sub – Division, Sivasagar, Assam. The area is rich in the diversity of plants due to its various edaphic, climatic and other ecological factors, favouring a unique ecosystem where aroids coexist with other plant species. A total of 26 species belonging to 17 genera were collected from the site. Out of which 8 species (32%) are edible and 18 species are ornamental (68%) and terrestrial (14) 54%, Climbers (9) 35% marshy land (2) 8% & aquatic (1) 4%.

**Keywords**: Aroids, Diversity, Sivasagar, Edible and Ornamental

**INTRODUCTION**

Araceae, also known as the Arum family are often colloquially known as aroid. It is monocotyledonous flowering plants in which flowers are borne on a type of inflorescence called a spadix. The spadix is partially enclosed in, a spathe or leaf-like bract. The family includes many ornamental plants such as *Aglaonema, Caladium*, etc. and edible plants such as *Amorphophallus, Alocasia, Colocasia*, etc. Species of Araceae are often rhizomatous or tuberous and are often found to contain calcium oxalate crystals or raphides.

They are generally a tropical family and are distributed worldwide (Sulaiman & Mansor, 2005). Aroids are found in various natural habitats such as swamps, ponds, lakes, canals, rivers to rice fields, climbers and as well as epiphytes. Some species thrive well in forest floors with good canopy coverage. This family is grouped into nine subfamilies, 106 genera and 3200 species (Croat, 1979, 1992, 1994).

Though, pioneer and comprehensive study on floristic studies of Aroids had been conducted in Assam (Rao & Verma, 1968, 1976); Majuli (Islam, 1990); and the other parts of India such as Manipur (H. Singh, 1993); Howrah District (Bennet, 1979); the Presidency of Bombay (Cooke, 1906; Blatter & McCann, 1931); Nainital in Uttar Pradesh (Gupta, 1968), the Bashahr Himalayas (Nair, 1977); the Chikihagular District, Karnataka, (Bhat, 1993; Yoganarasimhan *et al.*, 1981); the peninsular India (Karthikeyan *et al.*, 1989) Punjab (Sharma, 1990), Andaman and Nicobar Islands (Kurz, 1893; Srivastava & Kumar, 1993), Barren Island (Prain, 1893), the Western Ghats (Yadav 1998) etc. Beside this, many systematic works on Araceae and its genera has been carried out by Arends *et al.*, (1982), Reumer (1984), Murata (1984, 1987, 1990 a,b,c), Gryanum (1985, 1986, 1990), Ray (1987a, b, 1988), Peterson (1989,1993), Hay (1982), Hay and Wise (1991), Bogner and Nicolson (1991) and Sriboonma *et al.*, (1994).

Many workers have given different reports on the total number of Indian aroids. According to the Flora of British India by Hooker there are 228 species and 31 genera of Indian aroids. Karthikeyan *et al.*, 1989 reported 25 genera and 138 species in India; Yadav (1998) has reported 29 genera and 150 species. But, still there is no clear cut evidences on the total number of Indian aroids.

Till date no proper taxonomical and molecular study on the aroids of Assam has been done. There is vast scope of aroids, as renewable energy source and industrial raw material, the development of agro-
industries and other research and development. The present paper is a small step regarding the diversity of aroids in the Nazira sub-division of Sivasagar district, Assam.

**Study Area**

Nazira subdivision is located in between 94°4’ & 95°2’ East Longitude & 26°5’ & 27°1’ North Latitudes, 80m (approx.) above the sea level, with Nagaland in the south and is about 147.64 sq. km. The climate is of tropical types characterized by four distinct seasons i.e. spring, summer, autumn and winter. The average annual rainfall ranges from 150–380 cm and the maximum temperature ranges between 32°C – 37°C in summer and the maximum between 10°C – 20°C. The soil of the area is rich in humus and the texture of the soil at different sites varied from sandy loam to clay loam with 1-5% stones occupied by its volume. The pH of the soil ranged from 4.3 to 6.5. It comprises of different ecological habitats such as foothills, reserve forest, swampy areas and historical tanks.

**MATERIALS AND METHODS**

The study was carried out throughout the Nazira subdivision in different seasons to make a complete record of different habitats of the species and their occurrence during 2008 – 2013 through field survey. Specimens were collected with their fertile parts and herbarium was prepared following Jain and Rao (1976) for future references. The species were identified based on Henderson (1954), Ridley (1925), Bown (1988), Hay (1996a, 1996b), Hetterscheid (1996), Bogner and Nicolson (1991) and Mayo et al. (1997). Specimens were also identified with the help of existing flora and manuals together consulting with the herbaria of Gauhati University and BSI, Shillong. Available literatures were also surveyed in order to check the validity and authenticity of vegetables used by the people of this area. The nomenclature of the species has been done according to International Plant Nomenclature Index (IPNI).

**RESULTS AND DISCUSSION**

The area is rich in the diversity of plants due to its various edaphic, climatic and other ecological factors, favouring a unique ecosystem where aroids coexist with other plant species. A total of 27 species belonging to 18 genera were collected from the site. Out of which 8 species (33%) are edible, 18 species are ornamental (67%) (Table1). Among them terrestrial is (14) 53%, Climbers (9) 32% marshy land (2) 7.5% & aquatic (2) 7.5%. (Figure1). Out of 27 species 30% (8) were edible, 41% (11) were ornamental and 29% (7) were non-edible (Figure 2).

Family Araceae is most diversified group of monocotyledons. It shows great variations in habit and habitat preferences. The members of this family show remarkable variation in form and colour of spathe and appendages, spadix architecture, male & female flowers and sexuality (Yadav 1998). For example, in *Pothos scandens* appendages are absent, spadix is globular monoecious, spathe is yellow to green in colour. *Amorphophallus bulbifera* have yellow to red slender appendages which is short, thick and blunt while spathe is white pink, while in *Pistia stratiotes* spathe is short, small and green in colour (Yadav 1998). In *Alocasia odora*, appendages is white while in *A. cucullata* and *A. macrorrhizos* is yellowish in colour and while spathe is green in colour. In *A. macrorrhizos* appendages spadix is shorter than the spathe.

Aroids which consist of many underground food crops are grown in several tropical and sub-tropical countries. Edible aroids, especially *Alocasia Amorphophallus* and *Colocasia* are cultivated globally and are important food crops in India, Southeast Asia, and the Pacific Islands. They produce edible starchy storage corms. The mature corms, young shoots and leaves of edible aroids are mostly used as boiled vegetables, and are also roasted, baked, or fried. Roasted or boiled corms can be eaten alone or with stew. People eating *Colocasia esculenta* and some of its varieties should be very careful as it contains chemicals which are acrid and may cause choking and intense irritation of the tongue and throat and mouth in some persons.
Table 1: List of species collected from the study area

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of the species</th>
<th>Subfamily</th>
<th>Common Name</th>
<th>Habit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Alocasia cucullata (Loureiro) G. Don</td>
<td>Aroideae</td>
<td>Kachu</td>
<td>T</td>
</tr>
<tr>
<td>2</td>
<td>Alocasia fornicata (Roxb.) Schott</td>
<td>Aroideae</td>
<td>Kachu</td>
<td>T</td>
</tr>
<tr>
<td>3</td>
<td>Alocasia indica (Roxb.) Schott</td>
<td>Aroideae</td>
<td>Man-kachu</td>
<td>T</td>
</tr>
<tr>
<td>4</td>
<td>Alocasia macrorhiza (L.) G. Don</td>
<td>Aroideae</td>
<td>Kachu</td>
<td>T</td>
</tr>
<tr>
<td>5</td>
<td>Alocasia odor (Roxb.) Koch.</td>
<td>Aroideae</td>
<td>Dahi Kochu</td>
<td>T</td>
</tr>
<tr>
<td>6</td>
<td>Alocasia sp.</td>
<td>Aroideae</td>
<td>Kachu</td>
<td>T</td>
</tr>
<tr>
<td>7</td>
<td>Amorphophallus bulbifera (Roxb.) Bl.</td>
<td>Aroideae</td>
<td>Ol-kachu</td>
<td>T</td>
</tr>
<tr>
<td>8</td>
<td>Caladium bicolor (Aiton) Ventenat</td>
<td>Aroideae</td>
<td></td>
<td>T</td>
</tr>
<tr>
<td>9</td>
<td>Caladium sp.</td>
<td>Aroideae</td>
<td></td>
<td>T</td>
</tr>
<tr>
<td>10</td>
<td>Colocasia esculenta (L.) Schott</td>
<td>Aroideae</td>
<td>Kola-kachu</td>
<td>T</td>
</tr>
<tr>
<td>11</td>
<td>Dieffenbachia sp.</td>
<td>Aroideae</td>
<td></td>
<td>T</td>
</tr>
<tr>
<td>12</td>
<td>Epipremnum pinnatum (L.) Engler var. aureum</td>
<td>Monosteroideae</td>
<td>Gondh-chana</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Homalomena aromatica (Roxb.) Schott</td>
<td>Aroideae</td>
<td>kachu</td>
<td>T</td>
</tr>
<tr>
<td>14</td>
<td>Lasia spinosa (L.) Thw.</td>
<td>Aroideae</td>
<td>Chengamora</td>
<td>M</td>
</tr>
<tr>
<td>15</td>
<td>Monstera deligiosa Liebm.</td>
<td>Monosteroideae</td>
<td></td>
<td>C</td>
</tr>
<tr>
<td>16</td>
<td>Philodendron sp.</td>
<td>Aroideae</td>
<td></td>
<td>C</td>
</tr>
<tr>
<td>17</td>
<td>Pistia stratiotes L.</td>
<td>Pistoideae</td>
<td>Bar-puni</td>
<td>A</td>
</tr>
<tr>
<td>18</td>
<td>Pothos scandens D.Don. Syn. P. cathcartii Scout</td>
<td>Pothoideae</td>
<td>Pothos</td>
<td>C</td>
</tr>
<tr>
<td>19</td>
<td>Rhaphidophora sp.</td>
<td>Monosteroideae</td>
<td></td>
<td>C</td>
</tr>
<tr>
<td>20</td>
<td>Rhaphidophora tetrasperma Hook.f.</td>
<td>Monosteroideae</td>
<td></td>
<td>C</td>
</tr>
<tr>
<td>21</td>
<td>Steudnera assamica Hook. f.</td>
<td>Aroideae</td>
<td></td>
<td>M</td>
</tr>
<tr>
<td>22</td>
<td>Syngonium macrophyllum Engl.</td>
<td>Aroideae</td>
<td></td>
<td>C</td>
</tr>
<tr>
<td>23</td>
<td>Syngonium podophyllum Schott var. White Butterfly</td>
<td>Aroideae</td>
<td></td>
<td>C</td>
</tr>
<tr>
<td>24</td>
<td>Syngonium sp.</td>
<td>Aroideae</td>
<td></td>
<td>C</td>
</tr>
<tr>
<td>25</td>
<td>Typhonium trilobatum (L.) Schott.</td>
<td>Aroideae</td>
<td>Chema kachu</td>
<td>T</td>
</tr>
<tr>
<td>26</td>
<td>Xanthosoma sagittifolium (L.) Schott.</td>
<td>Aroideae</td>
<td>Kachu</td>
<td>T</td>
</tr>
</tbody>
</table>

NB: T: Terrestrial, C: Climber, M: Marshy Land and A: Aquatic

Figure 1: Showing the Percentage of Habit of the Species in the Study area
A general analysis of food value in aroid corms reflects high carbohydrate. The contents of starch and unavailable carbohydrates (cellulose, hemicelluloses and pectin) were 54 and 15% of the dry matter, respectively. Crude protein content is 10.4% of the dry matter. This protein has low in the sulphur containing amino acids and tryptophan, but contained adequate levels of the other essential amino acids. (Hussain, 1984). The leaves are excellent source of high protein, high vitamins A, C B₂ and B₁, high Ca
and moderate Fe. In combination leaves and corms represent a balanced food resource with very high digestibility and favourable amino acid composition (Steinke, et al., 1982), though the protein percentage drops in proportion to the amount of corm to leaf in the mix and the proportion of lysine in the amino acid content (Steinke et al., 1982, Thacker et al., 1990 and Plucknett, 1970). These shortages can be amended by the addition of fish. The corm is an excellent source of potassium (higher than banana), carbohydrate for energy, fibre, calcium and iron. The Lasia rhizome possessed a wide-ranging antioxidant capacity. The rhizome is a rich source of dietary fibre with 40% - 75% of total dietary fibre on dry weight basis, (7.2% - 7.5% on fresh weight basis) constituting 35% - 60% and 4% - 18% of insoluble and soluble fibre respectively (Shefana et al., 2009).

Despite the economic importance of edible aroids as a food material in the tropics and sub-tropics, they are considered as neglected and underutilised crops. Also known as orphan crops, these aroids lack the attention in modern plant breeding despite having long remained a source of both food and nutritional security. Its indispensable value has gained a place in the ex situ conservation and utilisation crop diversity strategies of the Pacific and South, Southeast and East Asia. Anthurium sp, Caladium bicolor, Dieffenbachia sp, Epipremnum sp., Monstera delicosa, Philodendron sp. and Pistia stratiotes L. most widely used as ornamental plants, for their beautiful foliage and can be grown as houseplants, or outdoors in mild climates in shady spots and have a huge economic values.

In the 21st century where the resources are dwindling, problems of food security, etc. The aroids can play a big role as there is vast scope of utilizing them, as renewable energy source and industrial raw material, the development of agro-industries and other research and development because of their easy access, availability and minimum expenditure for growing them.

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