

Angiospermic Plant Resources of Palashbari Area of South Kamrup District of Assam with Special Reference to Pollen Morphology of certain *Ipomoea* spp.



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Abstract

Palashbari is located in the South Kamrup district of Assam at a distance of 23 km west of Guwahati city proper and in the South Bank of river Brahmaputra. The area lies between 26° 1' 5" North latitude to 91° 5' 4" East longitude. The present survey of Palashbari area (comprising of Dakhala hills, plain areas and few small wetlands) deals with the wild angiospermic flora (Dicotyledons and Monocotyledons) and also palynotaxonomical study of certain species of *Ipomoea*. A total of 214 species that includes 149 Dicot and 65 Monocot species belonging to 74 different families, were collected and identified. Also, pollen morphological features of three species of the *Ipomoea* were enumerated.

Keywords: Floristics, Plant Resource Utilization, Pollen Morphology, Palashbari, Assam

Introduction

Floristic study is a work devoted to the plants of a particular area or region (George H. M. Lawrence, 1951). It covers any area from small patch of a forest to a large district, state or country. The word "Flora" means Goddess of flowers and plants. In the Roman mythology she was the Goddess of fertility. As we know that angiospermic flora dominates the earth's surface and vegetation in terrestrial habitat. As a result floristic study of an area becomes the most important part of plant taxonomy.

Again, the Palynotaxonomy is the science of pollen grain and spore which is valuable aid for taxonomic identification and delimitation of taxa. The morphological characters of pollen are categorized under apertures, size and shape and exine sculpture. Among these aperture character is considered to be of primary importance, the exine surface pattern as secondary and others as tertiary (Nair, 1970). Erdtman (1952), has provided an excellent survey of the use of pollen morphology in taxonomic studies. He grouped the pollen of Convolvulaceae family in *Ipomoea type* and *other type* based on the exine sculpture. The pollen morphology of Convolvulaceae is highly diverse and has taxonomic importance (Telleria and Daners, 2003).

As a part of the perusal of literature for the present work, emphasis was mostly given to the angiosperm floristic studies and the angiospermic plant resource utilization from the erstwhile Kamrup district as well as the state of Assam, India. In that connection, a series of random published standard works in the journals, books and PhD thesis up to the very recent years that are relevant to the present work has been taken into consideration as standard reference. Some of the references for literature study for the present study are, Barua (2001), Das *et al.* (2006), Kar & Borthakur (2007), Baruah *et al.* (2010), Deka *et al.* (2012), Kar *et al.* (2012), Das (2013), Dutta & Kalita (2013), Handique (2013), Barooah & Ahmed (2014), BSI (2015), Chaudhury & Kalita (2015), Das *et al.* (2015), Nath (2015), Boro (2016), Daimari B., Bhuyan & Baruah (2016), Saharia & Yasmin (2016), Saensouk & Saensouk (2017), Tamuli & Ghosal (2017), Bhuyan & Chetia (2018).

Significantly no such documentation work has been reported specifically on the angiospermic plant diversity and their traditional uses and also pollen morphology study from the Palashbari area.

With this backdrop of study, an attempt has been made to enumerate the available wild angiospermic plant species and their utilization and also the pollen morphology study of certain species of *Ipomoea* under the family Convolvulaceae that were present in the Palashbari area of South Kamrup district of Assam.

Study Area

Palashbari is located in the South Kamrup district of Assam at a distance of 23km west of Guwahati city proper and in the South Bank of river Brahmaputra. The area lies between 26°1'5" North latitude to 91°5'4" East longitude and has an average elevation of 46 metres (150feet). The geographical area of Palashbari is 25 sq. km (Approx). The Palashbari area is surrounded in the north by mighty river Brahmaputra; in the south *Harpura*, *Sikarhati* and *Majgaon* villages; in the east *Pub-Borjhar* village and Gopinath Bordoloi International Airport and in the south *Bijoynagar* area.

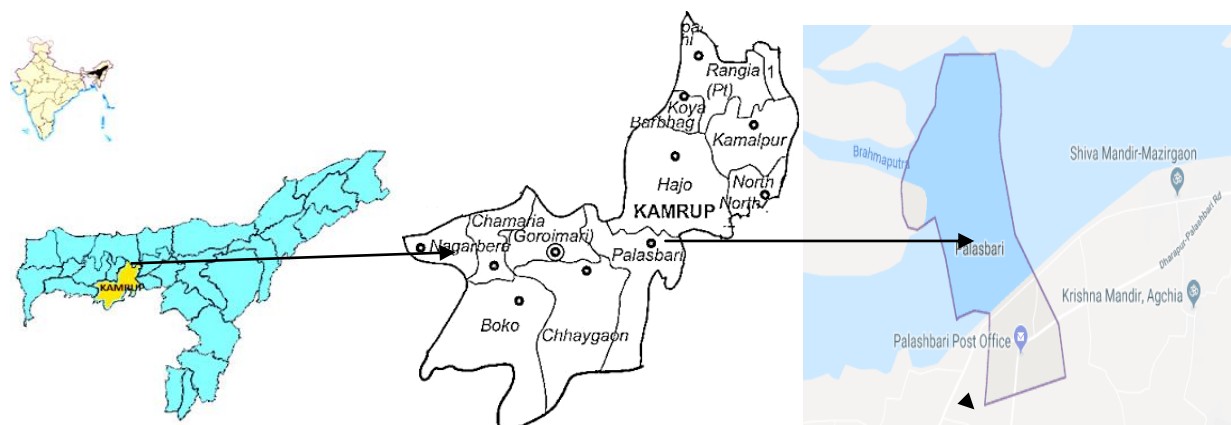
There is a river channel known as *Kalbhog* run through this town from South to North. Two main wetlands namely *Dora beel* and *Cholcholi beel* are present in this area with rich and diversified flora. Besides these, there are two prominent hillocks namely *Dakhala* and *Maliata* present in the northern boundary and southern boundary of Palashbari, respectively.

The study area is mainly composed of alluvial soil of Precambrian gneissic complex. The mean maximum and minimum temperature varies from 38°C to 7°C. The annual rainfall is 1335 mm and about 90% of the rain occurs in between April and September. The vegetation of this area is mainly semi-evergreen and mixed deciduous forest with the presence of sub-tropical broad-leaf hill forest.

As Palashbari is a large area, the present study comprises from *Dakhala hill* to *Mazirgaon* village covering a large number of *beels* and marshes having wonderful terrestrial and aquatic vegetation. The *Dakhala hill* is a very beautiful hillock having a great historical background. There is a *Than* (one kind of temple) called *Dakhala Bura Gosai Than*, is situated there in the top of the hillock. In this *Than* devotees came to worship the presiding deity.

There is a folk tale regarding the medicinal and aromatic plants of *Dakhala hill*. According to the folk tales, *Dakhala hill* is one of the smallest part of the mount *Dronagiri* (*Mahodaya*) in the Himalayas. In Hindu mythology it was believed that, when lord Hanuman was called upon to fetch the *Sanjeevani* herb from the *Dronagiri* mountain, he lifted the whole mount and brought it to the Battlefield. When he bought this mount, one part of it may fell on the bank of the river Brahmaputra near the *Palashbari* area. This small part of the *Dronagiri* mountain is named as *Dakhala hill*. That is why *Dakhala hill* is also called as *Baidyagiri* due to the availability of its medicinally valuable plants.

Map: 1: Location map of Palashbari Area of South Kamrup District, Assam



Materials and Methods

A survey on the flora of Palashbari area was conducted for documentation of wild angiospermic plants. The species were collected randomly as far as on weekly basis particularly Sunday from *Dakhala hill* and also the plain area of Palashbari. This was done in order to observe their flowering and fruiting habit along with their important aspects such as flowering, fruiting, plant habit and their uses etc. The collected samples were pressed and dried for herbarium preparation following standard techniques (Jain and Rao, 1977) and submitted to the Gauhati University Botany Department Herbarium (GUBH). The specimen were identified consulting literature and comparing with the ASSAM herbarium (BSI, Eastern circle,

Shillong) as with that of GUBH. Prior Informed Consent was taken from local *Gaon Burhas* and the priest of *Dakhala Bura Gosai Than* and also discussed clearly about the Intellectual Property Rights and benefit sharing issues of the study outcome, arises if any, in future.

For the pollen study, 3 species of the genus *Ipomoea* namely *Ipomoea carnea*, *I. vitifolia* and *I. turpethum* were selected. For pollen analysis, mature pollen was collected from mature anther and was acetolysed with a proper acetolysis method (Erdtman, 1952). After that, the grains were mounted in gelatin jelly and sealed by applying paraffin wax and heated gently. Then the slide was observed under

high powered compound microscope and were measured and identified.

Result and Discussion

In the present study, a total of 221 species under 177 genera and 66 families were recorded. Out of the total recorded species, dicotyledons comprises about 156 species, belonging to 130 genera and 51 families and the monocotyledons comprises about 65 species, and those belongs to 47 genera and 15 families (Fig-1 /Table-1 and Table-2).

Among the dicotyledons, Asteraceae is the most dominant family in the area in respect to number of species (15 spp.) followed by Acanthaceae (9 spp.), Lamiaceae (8 spp.), Caesalpiniaceae (8 spp.), Solanaceae (7 spp.), Moraceae (7 spp.), Amaranthaceae (6 spp.), Euphorbiaceae (6 spp.),

Rubiaceae (6 spp.), Verbenaceae (6 spp.) are recorded from the area.

Again, among Monocots, Poaceae is the most dominant family in respect to the number of species recorded (25 spp.), which is followed by Cyperaceae (11 spp.), Araceae (7 spp.), Orchidaceae (4 spp.), Zingiberaceae (4 spp.). In terms of the number of species under the genus *Solanum* (5 spp.), *Ficus* (5 spp.), *Cassia* (4 spp.), *Amaranthus* (3 spp.) and *Ipomoea* (3 spp.) are found dominant in the study area. Again, among the monocots the *Cyperus* (9 spp.) is the most dominant genus followed by *Bambusa* (4 spp.), *Saccharum* (3 spp.), *Oplismenus* (2 spp.), *Curcuma* (3 spp.), *Dioscorea* (2 spp.), *Musa* (2 spp.), etc.

Fig-1: Total recorded Angiospermic Families, Genera and Species of Palashbari Area

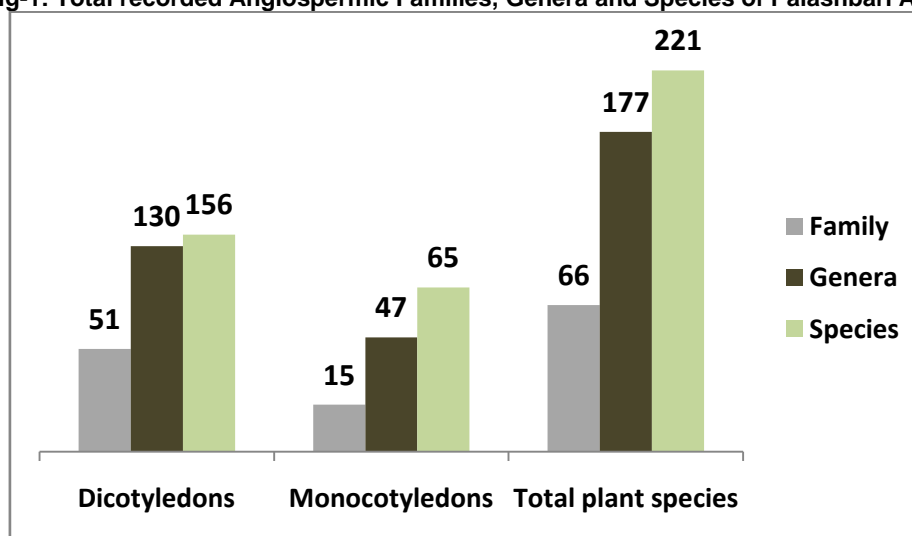


Table 1: Dicotyledons Plant Species of Palashbari area with their uses:

Scientific Name; Exsiccate	Family	Habit	Uses
<i>Abutilon indicum</i> (L.) Sweet [NB-011]	Malvaceae	Herb	Used to treat fever, cough, lung disease.
<i>Acalypha indica</i> L. [NB-008]	Euphorbiaceae	Herb	Used to treat asthma and pneumonia.
<i>Adhatoda vasica</i> , Nees [NB-018]	Acanthaceae	Shrub	Used in respiratory troubles.
<i>Anisomeles ovata</i> , Br. (L.) Kuntze [NB-009]	Lamiaceae	Shrub	Useful in the affections of the stomach and bowels. Also used in rheumatism arthritis.
<i>Achyranthes aspera</i> L. [NB-005]	Amaranthaceae	Herb	As antidote medicine for snake bite.
<i>Albizia lebeck</i> (L.) Benth [NB-002]	Mimosaceae	Tree	Timber plant
<i>Albizia saman</i> (Jacq.) Merr. [NB-007]	Mimosaceae	Tree	Folk remedy for colds, diarrhea, headache, intestinal ailments and stomachache.
<i>Alternanthera philoxeroides</i> (Mart.) Griseb [NB-001]	Amaranthaceae	Herb	Useful in stomach pain and asthma.
<i>Alternanthera paronychioides</i> A. St.-Hill. [NB-003]	Amaranthaceae	Herb	As vegetables.
<i>Amaranthus spinosus</i> L. [NB-014]	Amaranthaceae	Herb	As vegetables.
<i>Amaranthus hybridus</i> L. [NB-010]	Amaranthaceae	Herb	As vegetables.
<i>Amaranthus viridis</i> L. [NB-004]	Amaranthaceae	Herb	As vegetables.
<i>Ammania baccifera</i> L. [NB-015]	Lythraceae	Herb	Useful in Malaria fever, jaundice.
<i>Andrographis paniculata</i> (Burm.f.) Nees [NB-006]	Acanthaceae	Herb	Used to treat infectious diseases.
<i>Argemone maxicana</i> L. [NB-012]	Papaveraceae	Herb	Useful in kidney pain.
<i>Argyria nervosa</i> (Burm.f.) Boj. [NB-016]	Convolvulaceae	Climber	As vegetable.
<i>Artocarpus lakoocha</i> Roxb. [NB-013]	Moraceae	Tree	The bark is chewed with paan (betel).
<i>Azadirachta indica</i> A. Juss. [NB-017]	Meliaceae	Tree	Useful in skin diseases.
<i>Azeratum conyzoides</i> L. [NB-036]	Asteraceae	Herb	As fodder.

<i>Bauhinia acuminata</i> L. [NB-039]	Caesalpiniaceae	Tree	Edible
<i>Bauhinia variegata</i> L. [NB-037]	Caesalpiniaceae	Tree	Edible
<i>Blumea lacera</i> (Burm.f.) DC. [NB-038]	Asteraceae	Herb	As treatment of bronchitis.
<i>Bombax ceiba</i> L. [NB-035]	Bombacaceae	Tree	Use to cures pimples.
<i>Borreria articularis</i> (L.f.) Will. [NB-091]	Rubiaceae	Herb	As fodder
<i>Brassica campestris</i> L. [NB-103]	Brassicaceae	Herb	As vegetables
<i>Butea monosperma</i> (Lam.) Kuntz [NB-089]	Fabaceae	Tree	Used in rituals (flower used).
<i>Caesalpinia pulcherima</i> f. flava [NB-88]	Caesalpiniaceae	Tree	Ornamental tree
<i>Callicarpa arborea</i> Roxb. [NB-106]	Verbenaceae	Tree	As wrapper for food fermentation.
<i>Calotropis gigantea</i> R.Br. [NB-092]	Asclepiadaceae	Shrub	Useful in muscles pain.
<i>Calotropis procera</i> (Ait.) Roxb. [NB-104]	Asclepiadaceae	Shrub	Used to treat asthma
<i>Cannabis sativa</i> L. [NB-095]	Cannabaceae	Herb	As vegetable
<i>Cardiospermum helicacabum</i> L. [NB-102]	Sapindaceae	Herb	Edible.
<i>Cassia fistula</i> L. [NB-096]	Caesalpiniaceae	Tree	Timber plant
<i>Cassia siamea</i> Lamk. [NB-094]	Caesalpiniaceae	Tree	Shade tree.
<i>Cassia sophera</i> L. [NB-101]	Caesalpiniaceae	Herb	As fodder.
<i>Cassia tora</i> L. [NB-097]	Caesalpiniaceae	Herb	Useful in fever.
<i>Cayratia trifolia</i> (L.) Domin. [NB-100]	Vitaceae	Lianes	As fodder.
<i>Centella asiatica</i> (L.) Urban [NB-105]	Apiaceae	Herb	Useful in dysentery.
<i>Clerodendrum infortunatum</i> L. [NB-093]	Lamiaceae	Herb	Traditional medicine of diarrhea, liver disorders
<i>Cleome ruidosperma</i> Var. burmanni Wight & Arn. [NB-098]	Capparidaceae	Herb	As fodder
<i>Cleome gynandra</i> L. [NB-099]	Capparidaceae	Herb	As vegetables
<i>Crassocephalum crepidioides</i> (Benth.) S. Moore. [NB-106]	Asteraceae	Herb	Leaf lotion or decoction used to treat headaches.
<i>Crotalaria pallida</i> Aiton. [NB-082]	Fabaceae	Herb	To treat urinal disease
<i>Croton bonplandianum</i> Baill. [NB-086]	Euphorbiaceae	Herb/ Shrub	Used as a fuel and detergent
<i>Croton caudatus</i> Geisel. [NB-083]	Euphorbiaceae	Herb	As food plant larvae for some lepidoptera
<i>Cucumis melo</i> L. [NB-087]	Cucurbitaceae	Climber	Edible
<i>Cuphea carthagenesis</i> (Jacq.) J.F. Macbr. [NB-081]	Lythraceae	Herb	Used in the treatment of high blood pressure.
<i>Deeringia amaranthoides</i> (Ham) Merr. [NB-079]	Amaranthaceae	Scandent	Juice of the ripe fruit is used as substitute for red ink
<i>Delonix regia</i> (Bojer) Raf. [NB-084]	Caesalpiniaceae	Tree	Ornamental plant
<i>Dicliptera bupleuroides</i> Nees. [NB-080]	Acanthaceae	Herb	Used against diabetes
<i>Dillenia indica</i> L. [NB-085]	Dilleniaceae	Tree	Fleshy calyx is edible and is anti-diabetic.
<i>Drymaria cordata</i> (L.) Wild. ex schult. [NB-078]	Caryophyllaceae	Herb	Paste of plant used on tongue in fungal infection, juice is given in sinusitis
<i>Duchesnea indica</i> (Jacks.) Focke [NB-049]	Rosaceae	Herb	Edible
<i>Eclipta alba</i> (L.) Hassk [NB-044]	Asteraceae	Herb	Used to rejuvenates memory, hair, teeth etc.
<i>Elephantopus scaber</i> L. [NB-051]	Asteraceae	Herb	Edible(leaves)
<i>Emilia sonchifolia</i> (L.) DC. ex DC. [NB-046]	Asteraceae	Herb	The juice of this plant is used to treat diarrhoea
<i>Erythrina stricta</i> Roxb. [NB-042]	Papilionaceae	Tree	Used in bio-fencing
<i>Eupatorium odoratum</i> L. [NB-043]	Asteraceae	Herb	To treat common cold, fever and influenza
<i>Euphorbia hirta</i> L. [NB-040]	Euphorbiaceae	Herb	Use to treat eczema
<i>Evolvulus nummularis</i> (L.) L. [NB-045]	Convolvulaceae	Herb	As vegetable
<i>Ficus benghalensis</i> L. [NB-041]	Moraceae	Tree	Use in rituals
<i>Ficus benjamina</i> L. [NB-053]	Moraceae	Tree	Ornamental plant
<i>Ficus elastica</i> Roxb. [NB-047]	Moraceae	Tree	Use in rituals
<i>Ficus hispida</i> Vahl. [NB-052]	Moraceae	Tree	As vegetable
<i>Ficus religiosa</i> L. [NB-048]	Moraceae	Tree	As rituals
<i>Flemingia strobilifera</i> L. [NB-050]	Fabaceae	Shrub	Root decoction used in menstrual irregularities
<i>Gmelina arborea</i> Roxb. [NB-43]	Verbenaceae	Tree	Used in furniture making
<i>Gnaphalium indicum</i> L. [NB-50]	Asteraceae	Herb	Edible
<i>Glycosmis pentaphylla</i> (Retz.) DC. [NB-143]	Rutaceae	Shrub	Juice of leaves used for fever.

<i>Gravelia robusta</i> A. Cunn.ex R.Br. [NB-137]	Proteaceae	Tree	Ornamental plant
<i>Hedyotis diffusa</i> Willd. [NB-140]	Rubiaceae	Herb	Used in snake bite and cancer disease.
<i>Heliotropium indicum</i> L. [NB-144]	Boraginaceae	Herb	To treat warts, inflammation and tumours.
<i>Holarrhena antidysenterica</i> (Roth) Wall.ex.A.DC. [NB-138]	Apocynaceae	Tree	Used in dysentery
<i>Holmskioldia sanguinea</i> Retz. [NB-142]	Verbenaceae	Lianes	Ornamental plant
<i>Houttuynia cordata</i> Thunb. [NB-136]	Saururaceae	Herb	Used to reduce body pain(Bodyache)
<i>Hoya parasitica</i> Wall ex Traill [NB-139]	Asclepiadaceae	Epiphytic	Ornamental plant
<i>Hygrophila spinosa</i> T Ander [NB-141]	Acanthaceae	Herb	Used to treat aphrodisiac, renal tonic.
<i>Hyptis suaveolens</i> (L.) Poit. [NB-135]	Lamiaceae	Herb	Traditional medicine of diarrhea.
<i>Ipomoea carnea</i> Jacq. [NB-164]	Convolvulaceae	Shrub	Latex of the plant is used to treat skin disease.
<i>Ipomoea vitifolia</i> Sweet.(Valid Name: <i>Meremia vitifolia</i> Hallier f.) [NB-157]	Convolvulaceae	Climber	As fodder
<i>Ipomoea turpethum</i> R.Br. (Valid Name: <i>Operculina turpethum</i> Manso) [NB-159]	Convolvulaceae	Climber	It is used as a purgative, well known under the name of Turpeth root or Indian jalap.
<i>Justicia gendarussa</i> Burm.f.[NB-165]	Acanthaceae	Herb	Used in muscles pain
<i>Kalanchoe pinnata</i> (Roxb.)Pers. [NB-170]	Crassulaceae	Herb	As vegetable
<i>Lantana aculeate</i> L. [NB-160]	Verbenaceae	Herb	To treat dog bite
<i>Lagerstromia reginae</i> Roxb. [NB-166]	Lythraceae	Tree	Timber plant
<i>Lawsonia inermis</i> L. [NB-169]	Lythraceae	Small tree	As dye
<i>Leea guineensis</i> G.D [NB-161]	Vitaceae	Tree	To treat muscular pain, arthritis etc
<i>Lepidagathis incurva</i> Buch-Ham.ex D.Don [NB-167]	Acanthaceae	Herb	To treat pulmonary tuberculosis, hepatitis
<i>Leucas plukenetti</i> (Roth) Spreng. [NB-162]	Lamiaceae	Herb	Plant juice is used in nose in sinusitis and tonsil
<i>Lindernia crustacean</i> (L.) F.Muell. [NB-168]	Scrophulariaceae	Herb	As fodder
<i>Lindernia dubia</i> (L.) Pennel [NB-156]	Scrophulariaceae	Herb	Aquarium plant
<i>Lippia alba</i> (Mil.) N.E.Br.ex Britton & P.Wilson [NB-163]	Verbenaceae	Herb	Aromatic leaves are used in herbal baths, to cure fevers and severe stomach pain.
<i>Ludwigia abyssinica</i> A.Rich. [NB-155]	Onagraceae	Herb	Used to treat abdominal pain
<i>Ludwigia octovalvis</i> (Jacq.)Raven [NB-158]	Onagraceae	Herb	As fodder
<i>Mazus pumilus</i> (Burm.f.) Steenis [NB-149]	Schrophulariaceae	Herb	As fodder
<i>Melastoma malabathricum</i> L. [NB-152]	Melastomataceae	Herb	Paste is used to cuts and wounds. Decoction of root is to cure diarrhea.
<i>Melia azedarach</i> L. [NB-154]	Meliaceae	Tree	Timber plant
<i>Mesua ferrea</i> L. [NB-147]	Clusiaceae	Tree	Oil from the seeds is used for sore, scabies, wounds and rheumatism
<i>Mimosa pudica</i> L. [NB-148]	Mimosaceae	Herb	Root is used in male fertility
<i>Mikania micrantha</i> Kunth. [NB-153]	Asteraceae	Climber	Used to treat malaria and eczema
<i>Mirabilis jalapa</i> L. [NB-151]	Nyctaginaceae	Herb	Ornamental plant
<i>Mollugo oppositifolia</i> L. [NB-146]	Molluginaceae	Herb	Used in stomach problem
<i>Murraya koenigii</i> (L.) Spreng [NB-150]	Rutaceae	Shrub	Use to treat gastritis
<i>Nelsonia canescens</i> (Lam.) Spreng [NB-145]	Acanthaceae	Herb	Root is used as anti-inflammatory.
<i>Neolamarckia cadamba</i> (Roxb.) Bosser [NB-133]	Rubiaceae	Tree	Timber plant
<i>Nicotiana plumbaginifolia</i> Viv. [NB-129]	Solanaceae	Herb	As fodder
<i>Ocimum americanum</i> L. [NB-130]	Lamiaceae	Herb	Used in cold cough etc.
<i>Ocimum gratissimum</i> L. [NB-128]	Lamiaceae	Herb	Used to treat stomach problem and fever
<i>Oldenlandia corymbosa</i> L. [NB-134]	Rubiaceae	Herb	Folk medicine for fever and stomach problem.
<i>Oroxylum indicum</i> (L.)Vent. [NB-132]	Bignoniaceae	Tree	Used to treat intestinal worm
<i>Oxalis corniculata</i> L. [NB-131]	Oxalidaceae	Herb	Used in stomach problems.

<i>Oxalis debilis</i> var. <i>corymbosa</i> (Dc.) Lourteig [NB-127]	Oxalidaceae	Herb	Whole plant edible
<i>Paederia foetida</i> L. [NB-059]	Rubiaceae	Climber	As vegetables
<i>Pavetta indica</i> L. [NB-065]	Rubiaceae	Shrub	Used in the treatment of constipation, jaundice, headache, urinary diseases and dropsy.
<i>Peperomia pellucida</i> (L.) Kunth. [NB-062]	Piperaceae	Herb	The leaves along with stem are used in urinary disorder, fever.
<i>Phlogacanthus thyrsoiflorus</i> Nees. [NB-056]	Acanthaceae	Shrub	Whole plant is use in whooping cough and menorrhagia.
<i>Phyla nodiflora</i> (L.) Greene [NB-055]	Verbenaceae	Herb	Ornamental plant
<i>Physalis minima</i> L. [NB-063]	Solanaceae	Herb	Ripe fruit is used.
<i>Pogostemon benghalensis</i> (B) O.Ktz. [NB-058]	Lamiaceae	Shrub	Leaf paste is used in Burning
<i>Poungamia pinnata</i> L. [NB-067]	Papilionaceae	Tree	Ornamental plant
<i>Rauwolfia serpentina</i> (L.)Bentham ex.Kurz [NB-057]	Apocynaceae	Herb	Used to treat high blood pressure
<i>Ricinus communis</i> L. [NB-060]	Euphorbiaceae	Shrub	As silk worm host plant.
<i>Roripa apetala</i> Y.Y.Kim & B.U.oh [NB-061]	Brassicaceae	Herb	As vegetables
<i>Rungia congoensis</i> C.B.Clarke [NB-064]	Acanthaceae	Herb	Used due to its antioxidant property
<i>Rumex maritimus</i> L. [NB-066].	Polygonaceae	Herb	Used to treat boil and swelling
<i>Scoparia dulcis</i> L. [NB-054]	Scrophulariaceae	Herb	To treat cough
<i>Senna occidentalis</i> (L.) Link [NB-126]	Leguminosae	Shrub	As coffee substitute.
<i>Senna hirsuta</i> (L.) H.S.Irwin & Barneby [NB-111]	Leguminosae	Herb/ Shrub	Leaves are used as kidney and skin disorders.
<i>Shorea robusta</i> , Gaertn. [NB-108]	Dipterocarpaceae	Tree	Timber plant
<i>Sida cordifolia</i> L. [NB-109]	Malvaceae	Herb	As ayurvedic medicine
<i>Sida rhombifolia</i> L. [NB-107]	Malvaceae	Herb	Decoction of tender leaf is given to cure hypertension
<i>Solanum anguivi</i> Lam. [NB-117]	Solanaceae	Herb/ Shrub	Young shoots and leaves are edible.
<i>Solanum angustifolium</i> Mill. [NB-112]	Solanaceae	Herb	As cattle fodder
<i>Solanum indicum</i> L. [NB-118]	Solanaceae	Herb	Used in coughs, congestion of chest due asthma and tuberculosis.
<i>Solanum nigrum</i> L. [NB-125]	Solanaceae	Herb	As vegetables
<i>Solanum torvum</i> Sw. [NB-113]	Solanaceae	Shrub	As vegetables
<i>Sphagneticola calendulacea</i> (L.) Pruski [NB-123]	Asteraceae	Herb	Used to treat cough.
<i>Spilanthes paniculata</i> Jacq.ex S.S. Renner, Balsev & Holm-Niels [NB-114]	Asteraceae	Herb	As health tonic
<i>Stellaria media</i> (L.) Vill [NB-119]	Caryophyllaceae	Herb	As vegetables
<i>Stephania japonica</i> (Thunb.) Miers [NB-124]	Menispermaceae	Climber	To treat cattle muscles infection
<i>Sterculia villosa</i> Roxb. [NB-122]	Sterculiaceae	Tree	Fiber is used
<i>Streblus asper</i> Lour. [NB-115]	Moraceae	Shrub/Tree	Used in toothache
<i>Synedrella nodiflora</i> (L.) Gaertn. [NB-120]	Asteraceae	Herb	Leaves used as pain killer
<i>Syzygium cumini</i> (L.) Skeels [NB-121]	Myrtaceae	Tree	Used against diabetes
<i>Tamarindus indica</i> L. [NB-116]	Papilionaceae	Tree	As chutney
<i>Tectona grandis</i> L. [NB-110]	Verbenaceae	Tree	Timber plant
<i>Terminalia arjuna</i> (DC.)W&A [NB-077]	Combretaceae	Tree	Used to treat heart disease
<i>Toona ciliata</i> M. Roem. [NB-072]	Meliaceae	Tree	Timber plant
<i>Tephrosia candida</i> (Roxb.) DC. [NB-076]	Leguminosae	Herb/ Shrub	As insecticide and Food poison
<i>Trewia nudiflora</i> L. [NB-071]	Euphorbiaceae	Tree	Timber plant
<i>Tridax procumbens</i> L. [NB-073]	Asteraceae	Herb	As fodder
<i>Turnera ulmifolia</i> L. [NB-070]	Passifloraceae	Herb/ Shrub	Leaves are used to treat hair loss and thrush
<i>Urena lobata</i> L. [NB-074]	Malvaceae	Herb	To treat diarrhea

<i>Vernonia cinerea</i> (L.) Less. [NB-068]	Asteraceae	Herb	As conjunctivitis
<i>Vitex negundo</i> L. [NB-075]	Lamiaceae	Shrub	To treat intestinal worm
<i>Xanthium strumarium</i> L. [NB-069]	Asteraceae	Herb	As vegetable

Table 2: Monocotyledons plant species of Palasbari area

Scientific Name	Family	Habit	Uses
<i>Acorus calamus</i> L. [NB-197]	Acoraceae	Herb	Medicinal value for a wide variety of ailments
<i>Aloe barbadensis</i> Mill. [NB-192]	Liliaceae	Herb	To Promote flow of urine
<i>Amorphophalus bulbifer</i> (Roxb.) Bl [NB-196]	Araceae	Herb	As vegetables
<i>Arundinella decempedalis</i> (Kuntze) Janowski [NB-194]	Poaceae	Grass/Herb	As fodder
<i>Axonopus compressus</i> (Sw.) P.Beauv. [NB-191]	Poaceae	Grass/Herb	As fodder
<i>Arundo donax</i> L. [NB-198]	Poaceae	Grass/Herb	In fencing
<i>Bambusa balcooa</i> Roxb. [NB-195]	Poaceae	Bamboo	A native dish called kharisa is made from this bamboo which is edible.
<i>Bambusa tulda</i> Roxb. [NB-193]	Poaceae	Bamboo	Young rhizomes are eaten as vegetables.
<i>Bambusa vulgaris</i> Schrader [NB-190]	Poaceae	Bamboo	In construction purpose
<i>Bambusa palida</i> Munro [NB-171]	Poaceae	Bamboo	In construction purpose
<i>Canna indica</i> L. [NB-178]	Cannaceae	Herb	Ornamental plant
<i>Caladium bicolor</i> (W. Ait.) Vent. [NB-189]	Araceae	Herb	Ornamental plant.
<i>Carex baccans</i> Nees. [NB-181]	Cyperaceae	Herb	Used due to its antihelmthic properties.
<i>Chrysopogon aciculatus</i> (Retz.) Trinius [NB-175]	Poaceae	Grass	As fodder
<i>Colocasia esculanta</i> (L.) Schott. [NB-188]	Araceae	Herb	As vegetables
<i>Commelina bengalensis</i> L. [NB-182]	Commelinaceae	Herb	As contraceptive
<i>Costus speciosus</i> (Koen.) Smith [NB-172]	Zingiberaceae	Herb	To treat jaundice
<i>Curcuma amada</i> Roxb. [NB-176]	Zingiberaceae	Herb	Used in chutney making
<i>Curcuma aromatica</i> Salib. [NB-173]	Zingiberaceae	Herb	Used in cosmetic herbal medicine
<i>Curcuma caesia</i> Roxb. [NB-183]	Zingiberaceae	Herb	Used in the treatment of asthma, tumours, piles, bronchitis etc.
<i>Cynodon dactylon</i> (L.) Pers [NB-179]	Poaceae	Herb	Used in ritual
<i>Cyperus brevifolius</i> (Rottb.) [NB-184]	Cyperaceae	Grass/Herb	Used due to its anti-inflammatory properties
<i>Cyperus cephalotes</i> vahl. [NB-187]	Cyperaceae	Grass/Herb	Stem is used for mat making
<i>Cyperus compactus</i> Retz. [NB-177]	Cyperaceae	Herb	As folk medicine
<i>Cyperus compressus</i> L. [NB-185]	Cyperaceae	Herb	As ornamental
<i>Cyperus difformis</i> L. [NB-180]	Cyperaceae	Herb	Leaves have antibiotic properties
<i>Cyperus diffusus</i> vahl. [NB-186]	Cyperaceae	Herb	Roots used as an antipyretic, diuretic agent.
<i>Cyperus pilosus</i> vahl. [NB-174]	Cyperaceae	Herb	As green manure
<i>Cyperus tenuispica</i> stend [NB-199]	Cyperaceae	Herb	As fodder
<i>Cyperus rotundus</i> L. [NB-204]	Cyperaceae	Herb	To treat cough
<i>Dendrobium aphylla</i> (Roxb.) Fischer [NB-200]	Orchidaceae	Epiphyte	Ornamental plant
<i>Dioscorea alata</i> L. [NB-201]	Dioscoreaceae	Vine	Tubers can be eaten
<i>Dioscorea bulbifera</i> L. [NB-207]	Dioscoreaceae	Vine	Air potato is used as a folk remedy to treat conjunctivitis, diarrhea and dysentery.
<i>Eleusine indica</i> Gaertn [NB-202]	Poaceae	Grass	As fodder
<i>Eragrostis uniloides</i> Nees. [NB-208]	Poaceae	Grass	As livestock fodder
<i>Eichornea crassipes</i> (Mart.) Solms [NB-206]	Pontedariaceae	Herb	As organic fertilizer
<i>Echinochloa colonum</i> (L.) link. [NB-205]	Poaceae	Grass	It used to control soil erosion
<i>Fimbristylis squarossa</i> vahl. [NB-203]	Cyperaceae	Grass	Used in sore throat
<i>Gloriosa superba</i> L. [NB-211]	Liliaceae	Shrub	Ornamental plant
<i>Hydrilla verticillata</i> (L.f.) Royle [NB-210]	Hydrocharitaceae	Herb	Aquarium plant

<i>Heteropogon contortus</i> (L.) P.Beauv.ex Roem & Schult [NB-216]	Poaceae	Grass/Herb	Used to thatch hale houses.
<i>Homalomena aromatic</i> (Roxb.)Schott. [NB-209]	Araceae	Herb	High demand in market for its aromatic oil.
<i>Imperata cylindrica</i> (L.) P. Beauv. [NB-214]	Poaceae	Grass	Used for thatching roofs of traditional house.
<i>Leersia hexandra</i> Sw. Prodr. [NB-219]	Poaceae	Grass	As fodder
<i>Lasia spinosa</i> (L.) Thw [NB-217]	Araceae	Herb	As vegetable
<i>Musa balbicianana</i> Colla. [NB-213]	Musaceae	Herb	As vegetables
<i>Musa ornata</i> Roxb. [NB-218]	Musaceae	Shrub	Ornamental banana
<i>Oplismenus burmanni</i> (Retz) Beauv [NB-215]	Poaceae	Herb	As fodder
<i>Oplismenus composites</i> L. [NB-212]	Poaceae	Herb	As fodder
<i>Panicum repens</i> L.[NB-024]	Poaceae	Grass	As fodder
<i>Papilionanthe teres</i> (Roxb.)Schltr [NB-027]	Orchidaceae	Epiphyte	Ornamental plant
<i>Phoenix sylvestris</i> Roxb. [NB-023]	Arecaceae	Palm	Edible
<i>Rynchosstylis retusa</i> (L.)Blume [NB-028]	Orchidaceae	Epiphyte	Cultural significance
<i>Saccharum procerum</i> Roxb. [NB-033]	Poaceae	Grass/Herb	As broomsedge
<i>Saccharum officinarum</i> L. [NB-022]	Poaceae	Shrub	Edible
<i>Saccharum spontaneum</i> L. [NB-030]	Poaceae	Herb	As fodder
<i>Sagittaria sagittifolia</i> L. [NB-026]	Alismataceae	Herb	Tuber is edible
<i>Schizostachyum polymorphum</i> (Munro.) Mazumdar [NB-032]	Poaceae	Bamboo	Used to make hats, baskets, decorative mats etc.
<i>Sorghum nitidum</i> (vahl) Pers [NB-021]	Poaceae	Herb	As fodder
<i>Typhonium trilobatum</i> (L.)Schott. [NB-029]	Araceae	Herb	As vegetable
<i>Thysanolaema maxima</i> Ktze .[NB-025]	Poaceae	Shrub	As broom
<i>Vetiveria zizanioides</i> (L.) Nash. [NB-031]	Poaceae	Grass	As fodder
<i>Vallisnaria spiralis</i> L. [NB-020]	Hydrocharitaceae	Grass/Herb	Aquarium plant
<i>Vanda roxburghii</i> R.Br. [NB-034]	Orchidaceae	Epiphyte	Ornamental plant
<i>Xanthosoma sagittifolium</i> (L.)Schott [NB-019]	Araceae	Herb	As vegetables

From the above tables, it can be said that many recorded plants have medicinal value. The *Dakhala hill* of Palashbari area is called as **Baidyagiri** due to the valuable medicinal plants present there. However, some plants have other uses also. The summary of the plants used in various purposes are given below-

Medicinal uses	No. of species	Medicinal uses	No. of species
Muscle pain	4	Sinusitis and tonsil	2
Skin diseases	4	Menstrual irregularities	1
Malarial fever	2	Cut and wounds	2
Dysentery	2	Burning	1
Stomach problem	7	Hypertension	1
Fever	8	Anticancer	1
Diabetes	2	Kill intestinal worm	2
Male fertility	1	Boil & Swelling	1
Health tonic	7	Body ache	1
Urinal diseases	3	Heart disease	1
Menstrual cycle	1		
Teeth ache	2	Miscellaneous uses	No. of species
Against dog bite	1	Vegetables	27
Conjunctivitis	1	Fodder	24
Cough	9	Rites & Ritual	5
Piles	1	Ornamental	17
Gastritis	1	Dye yielding	1
Against pimple	1	Coffee substitute	1

Anti-inflammatory properties	2		Silk worm host	1
Contraception	1		Construction	2
Kidney problem	3		Soil erosion	1
Bronchitis	3		Thatching	2
Asthma	5		Broom sedge	2
Liver disorder	1		Organic fertilizer	2
Jaundice	3		Aquarium plant	3
Snake bite	1		Mat making	2
Antipyretic and diuretic agent	1		Fencing	1
Pain killer	1		Aromatic plant	1
Hair loss and thrush	1		Cultural significance	1
Infectious disease	1		Timber & Fermented Food wrapper	8
Headaches	2		Fiber	1
Purgative	1		Fuel and detergent	1
Eczema	1		Bio-fencing	1
High blood pressure	2		Ripe fruits used as a substitute for red ink	1
Cattle muscle infection	1		Chutney	2

Again, from the pollen morphological investigation of 3 species of the genus *Ipomoea* reveals the following characteristics-

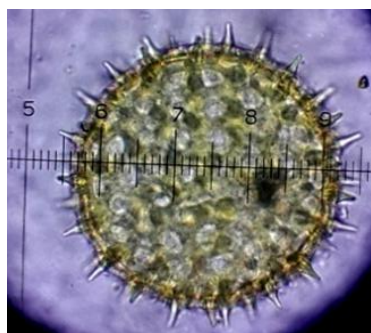
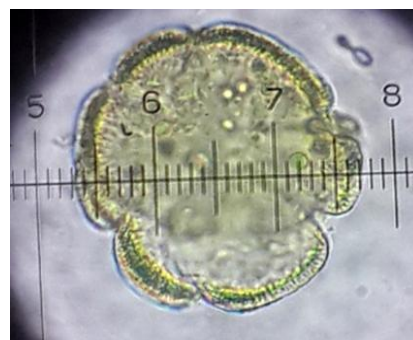
Table-3: Pollen grain characteristics of three *Ipomoea* sps.

Species	Aperture morphotype	Polarity	Symmetry	Pollen shape	Size	Exine sculpturing	Spine type	Exine thickness	Aperture length
<i>Ipomoea carnea</i>	Pantoporate	Apolar	Radial	Spheroidal	86×86μ	Rough, microreticulate echinate	Broad base with more or less acute tip (spine length-3μ)	4μ	3μ
<i>Ipomoea vitifolia</i> (Meremia vitifolia Hallier f.)	Pentacolpate to hexacolpate	Isopolar	Bilateral	Oblate spheroidal	50×52μ	Smooth with granulate	Spine with blunt apices	3μ (Ectexine is thicker than endexine)	2μ
<i>Ipomoea turpethum</i> (Operculina turpethum Manso)	Hexacolpate	Isopolar or polar	Bilateral	Oblate spheroidal	50×48μ	Smooth and microreticulate with granulate	Spine with blunt apices	3μ (Endexine is thicker than ectexine)	3μ

From the above palynological study it is evident that *Ipomea carnea* has broad based spine, gradually tapering towards the apex with a more or less acute tip but in *I. vitifolia* and *I. turpethum* having the spine with blunt apices.

Again, in *I. vitifolia* the pollen grain is prolate spheroidal but in *I. turpethum*, the pollen grain is oblate

spheroidal. Significantly, in case of *I. vitifolia*, the ectexine is thicker than endexine but in case of *I. turpethum* endexine is thicker than endexine. All those characters are taxonomically significant within and beyond species level.

Photo:1: *Ipomoea carnea* (40x)Photo:2: *I. vitifolia* (40x)Photo:3: *I. turpethum* (40x)

Conclusion

From the present study and documentation, it can be said that the floristic diversity of Palashbari area is very rich and show seasonal variation.

It is also evident from the mythology and present study that the *Baidyagiri hill (Dakhala Pahar)* is very rich in medicinal and aromatic plants.

The anthropogenic activity such as deforestation and wetland depletion are the major threats to the rich floras of this area. Therefore a systematic exploration, documentation and conservation of the flora and fauna is the urgent need of this area which can open up a new vistas as far as plant resource utilization is concerned. Regarding the present study there is no conflict of interest to be noted.

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