

Study of June Vegetation at Lalgarh Forest of Jhargram District in West Bengal, India

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Abstract- *The present paper reflects 88 important plant species under 42 families of forest floor at Lalgarh, Jhargram, West Bengal, India with ecological significance. The plant species grow luxuriantly since the 1st onset of monsoon i.e. from April through the average growth which shows on June with the profligacy of abundance. 30% of plant species offer flowering while rest plant species show vegetative growth which have high economic as well as greater significance of ecosystem services round the year. Green sal leaves, twigs, green fruits, ripe fruits, vegetative buds, eggs of red ants, immature flowers including fodder grass and tree branches are used widely for domestic purposes. So, month June of a year is a junction period of productivity of non-timber forest produces (NTFPs) round the year or the starting phase of production of NTFPs in Lalgarh forest of Southwest Bengal in India. Specific study on such NTFPs may be incorporated for further study and research in such area to make a productivity chart or model to manage the forest ecosystem in a crucial way to regulate the ecosystem dynamics in a non-linear way.*

Keywords- Lalgarh Forest, June Vegetation, Ecology of ground flora, Sustainable management.

I. INTRODUCTION

Lalgarh is important in Midnapore since pre-Maoist interaction though it became famous during counteraction of Govt. with Communist Party of India (Maoists) during 2009 (Anonymous, 2009a). According to the Journal after the 2009 Lok Sabha rout a weakened CPI (M) found itself the target of Maoist violence in Lalgarh, leading ultimately to the State Government bringing in Central Government forces (Anonymous, 2009b) to stop the action in and around Lalgarh. But the battle was truly a fiction between the Santras Birodhi Jana Sadharaner Committee and Maoist versus Police. So, it was basically a action i.e. People's Committee against Police Atrocities (PCAPA) to stop the negative activities in the area (Anonymous, 2009b). Ecologically Lalgarh is famous due to green and lush sal vegetation during monsoon, dry deciduous sal (*Shorea robusta*) vegetation during summer and leaf less stachy-wooded vegetation with huge ground litter during late summer when the ground cover goes to minimum and the productivity

tends to lower that indicates all are going to cease their productivity. The heterogeneous forest species occupy a wide range of lower tract in Chotanagpur plateau with abundant shrubby species during post monsoon, huge herbs during monsoon and underground floras like VAM and other larger fungal species flourish during post monsoon when the litter goes to decomposition. A degree of deviation of forest flora from site to site depends upon natural habitats, plantation stands and degraded lands where man mage activities for eco-degradation is minimum to high to higher.

Southwest Bengal has tropical dry deciduous forest and many valuable medicinal plants which have been reported from these forests time to time. However, a very few attempts have been made to study the aspects on these medicinal plants in varied physiognomic characters to record the resources from taxonomy, ecology and conservation biology or from forestry. But indeed it is so tiny that a wide spectrum of such study is essential to know the scenario of Traditional Knowledge (TK) based conservation biology to conserve the nature and natural resources in such degraded ecosystem (Das and Ghosh, 2017b).

Remembering these themes in mind, some aspects of these forest plants and the structure of plant species available in June have been studied from Lalgarh Forest of Southwest Bengal, India. Ecological status, botany and uses even survival of these too much important ecologically significant plants of Southwest Bengal have been studied. Therefore, the present study has been conducted to understand the actual scenario of ecological status of forest plants at Lalgarh, grown in and around Binpur-I community development Block of Southwest Bengal state in India.

II. AREA UNDER STUDY

The study area falls under Binpur-I CDB at Lalgarh of Jhargram District in Southwest Bengal part of West Bengal, India. It is situated both the sides of metallic road from Bhimpur to Lalgarh via Jhitka in Lalgarh. The sites were demarcated as forested lands, no plantation stand nearby, though enough degraded land, agricultural lands, waste land and canal banks are there. Only study at forests and in nearby

agricultural land was taken for consideration to study the vegetation. For strip study to locate the inventory based species star marked points along the line was studied. For quadrat analysis data was taken from the points marked as 'a, b, c, d' and 'e' respectively (Fig. 1).

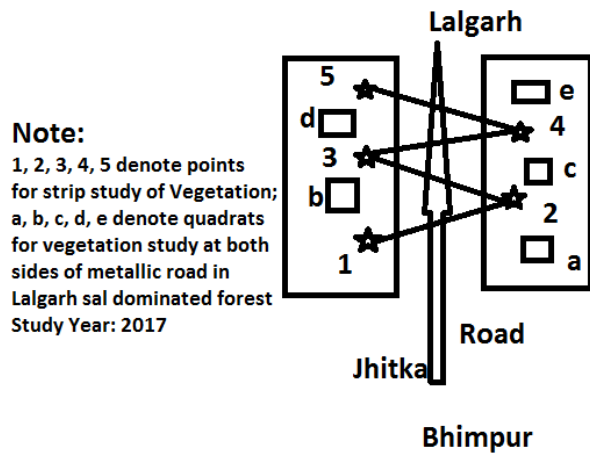


Figure 1. Showing the study sites under Lalgarh Forest of Jhargram District in West Bengal, India

III. MATERIALS AND METHODS

- Inventory of plants and species of ground vegetation study was carried out with the help of local people, working in field, who were daily collectors collected for twigs and leaves of the plants.
- A strip study covering 5m was traversed and record data was collected in field. A gap between two strips was 20 m which was studied using 5 x 5 m² quadrat for shrubs and 10 x 10 m² were used for tree species. 1 x 1 m² area was used for study the herbs using standard ecological methods available in the books mentioned for study in reference part.
- Along the road from Burababa Sacred grove to the end of the forest was studied using 2-wheeler in an interval of 6 days for successive 3 times. Photographs were taken and study was completed at laboratory using identification manual.
- Herbaceous specimens and record data was processed for further analysis and kept in my own custody.
- Floras, e-floras, monographs and manuals were used to standardize the data.
- Statistical package was used to find out the Standard deviation and standard error.
- Cross interviews and market study was done at villages and at Lalgarh weekly market (hat) in Binpur-I community development block, Lalgarh, Jhargram, West Bengal, India.
- Herbarium specimens were prepared and digitized to use further analysis of variance among the species and specimens.
- Photographs were taken for mushroom or similar valuable Non Timber Forest Products to record the species and study the same for near future.
- Literature used for complete study were different publications and books available time to time 1-41 where as for cross reference study internet materials were used during the preparation of manuscript 42-46

IV. RESULTS AND DISCUSSIONS

Lalgarh forest is dry deciduous vegetation which has less number under story vegetation during winter followed by summer but large number of vegetation during monsoon followed by late monsoon. Here, dominant tree species is sal (*Shorea robusta*) followed by other tree species which have the tenacity to shed off leaves during summer to form stachy type. A large number of climbers show their woody appearance but exhibit leafless due to forest fire in dry summer when temperature goes to 38 degree centigrade. At the end of the summer rain falls help the sprouting the advent growth of plants and forest becomes green. The scenic beauty attracts wild elephants, boars, avifauna, which becomes a productive ecosystem in the local environment. The forest is heterogeneous and multi-layered which is sal dominated by nature though ground cover boosts not only sal trees or saplings but other species in a heterogeneous way. Herbs and shrubs cover in a mixed form which is stratified by canopy, second canopy, climber and lianas and ground cover over the micro-flora in a fertile soil of Lalgarh forest under Medinipur Forest Division in West Bengal.

In total, June vegetation of Lalgarh forest shows 88 important plant species under 42 families which have the direct benefit to the society in connection with greater composition of productivity (Table 1). Here highest importance value index for tree species was found in case of *Shorea robusta* (IVI 4.9) followed by *Madhuca longifolia* (IVI 3.2). Highest IVI for shrubby species was observed in case of *Combretum decandram* (IVI 4.1) whereas lowest IVI value was observed in case of *Abelmoschus crinitus* (IVI 0.01) and *Asperagas racemosus* (IVI 0.01) in a same ecosystem during monsoon (June 2017). The side of the forest has large no. of medicinal species grown which are also used by the people. A good example is *Martynia annua* L. (Fig. 10). Other plants available as common like *Iswarmul*, *Satmul*, *Talamuli* etc.

The forest shows very luxuriant growth of climbers and shrubby species which are used by people for cattle feed though the wild use of plants is important for the ecosystem.

The floral composition shows 30% flowering during late June though most of the small herbaceous plants get ready to flourish soon. It suggested that rapid growth and development of floral composition and the interactions of the community encompasses the off bit tract for rapid establishment of advent growth in the area even settlement of new offspring from seeds prepared for the germination and those germinated ready for settlement. So, more or less the forest shows heterogeneity in connection with shrubby and herbaceous vegetation except the tree species as because no growth of stock takes place from the girth point of view. The tree species shows only the growth of shoots and vegetative parts like leaves and barks. Literally this means that IVI values is unchanged for tree species on the basis of seasons, though seasonal change only takes place for herbs and shrubs of the same area.

Table 1. Plant species in Forest of Lalgarh with their family name and Importance Value Index (IVI)

S L. N o.	Scientific Name	Family	Common Name	Importance Value Index
	Abelmoschus crinitus Wall. Syn.=Hibiscus crinitus (Wall.) G. Don	Malvaceae	Bandheras, Latkasturi (Fig. 9)	0.01
	Aegle marmelos (L.) Correa	Rutaceae	Bel, Bael, Bili	1.1
	Alstonia scholaris (L.) R. Br.	Apocynaceae	Chatim, Saptaparni	0.4
	Ampelocissus latifolia (Roxb.) Planch.	Vitaceae	Panibel	0.6
	Anacardium occidentale L.	Anacardiaceae	Kaju, Gach Badam	1.1
	Andrographis paniculata (Burm. f.) Wall. ex Ness.	Acanthaceae	Kalmegh	1.9
	Andropogon aciculatus Retz.	Poaceae	Chorkanta	1.7
	Anisomeles indica (L.) Kuntze.	Lamiaceae	Bantulsi, Gobura	2.1
	Anogeissus latifolia (DC.) Wall. ex Guill. & Perr.	Combretaceae	Dhaw	0.9

	Aristolochia indica L.	Aristolochiaceae	Iswarmul	0.8
	Asparagus racemosus Willd.	Liliaceae	Satamuli	0.01
	Atylosia scarabaeoides (L.) Benth.	Fabaceae	Ramkala, Bandarkala	0.6
	Azadirachta indica A. Juss.	Meliaceae	Neem, Nim	0.3
	Bauhinia purpurea L.	Caesalpiniaceae	Koiral, Kanchan	0.08
	Botrychium daucifolium (Wall.) Hook. & Grev.	Ophioglossaceae	Raiferan	0.9
	Bridelia retusa (L.) A. Juss.	Euphorbiaceae	Bakim, Geio	1.1
	Bridelia tomentosa Bl.	Euphorbiaceae	Choto Bakim, Kosai	1.5
	Buchanania lanzan Spreng.	Anacardiaceae	Chiranji	1.0
	Butea superba Roxb.	Fabaceae	Latpalash	0.6
	Careya arborea Roxb. Syn.= Barringtonia arborea (Roxb.) F. Muell.	Lecythidaceae	Kumbhi, Kumhi, Vakamba	0.4
	Carissa spinarum L.	Apocynaceae	Ban Karmocha	0.7
	Cassia fistula L.	Caesalpiniaceae	Bandarlathi, Amlatas	1.3
	Cassytha filiformis L.	Cassythaceae	Akashbel	2.2
	Cayratia trifolia (L.) Domin	Vitaceae	Goale lata	0.6
	Celastrus paniculata Wild.	Celastraceae	Malkagni, Jyotishmati	1.2
	Cissus adnata Roxb.	Vitaceae	Bhatia lat, Aliangalata	1.0
	Cleistanthus collinus (Roxb.) Benth. ex Hook. f.	Euphorbiaceae	Parasi	0.9
	Clerodendrum infortunatum L.	Verbenaceae	Bhant, Ghetu	2.0
	Combretum decandrum Jacq.	Combretaceae	Atang, Atmora	4.1
	Croton bonplandianum	Euphorbiaceae	Banlanka, Bantulsi	0.9

	Baill.			
	<i>Croton oblongifolius</i> Roxb.	Euphorbiaceae	Putli	1.6
	<i>Curculigo orchioides</i> Gaertn.	Hypoxidaceae	Talamuli	1.2
	<i>Dicliptera bupleuroides</i> Nees	Acanthaceae	Lal jhanti, Lal Sira	1.1
	<i>Dioscorea bulbifera</i> L.	Dioscoreaceae	Ban Khamalu	1.2
	<i>Dioscorea pentaphylla</i> L.	Dioscoreaceae	Panch Pata kahamalu	0.9
	<i>Dioscorea triphylla</i> L.	Dioscoreaceae	Tin Pata Khamalu	0.4
	<i>Diospyros melanoxyllum</i> Roxb.	Ebenaceae	Kendu, Kend	3.2
	<i>Diospyros sylvatica</i> Roxb.	Ebenaceae	Kelo Kendu	0.8
	<i>Elephantopus scaber</i> L.	Asteraceae	Hatikan	1.1
	<i>Eupatorium odoratum</i> L.	Asteraceae	Bankarpur	2.2
	<i>Feronia elephantum</i> Correa	Rutaceae	Kotbel	0.3
	<i>Ficus benghalensis</i> L.	Moraceae	Bot	0.4
	<i>Ficus glomerata</i> Roxb.	Moraceae	Pakur, Dumur	0.5
	<i>Flacourtia indica</i> (Burm. f.) Merr. Syn.= <i>Flacourtia ramaontchii</i> L.	Flacourtiaceae	Boichi	1.1
	<i>Flacourtia jangomas</i> (Lour.) Raeusch.	Flacourtiaceae	Tipa fol, Lukluki	0.1
	<i>Gardenia gummifera</i> L. f.	Rubiaceae	Bon Gandharaj	0.8
	<i>Gardenia latifolia</i> Aiton	Rubiaceae	Baro Ban Gandharaj, Jojon Gandha	1.1
	<i>Gelonium multiflorum</i> A. Juss.	Euphorbiaceae	Narenga	1.0
	<i>Glochidion lanceolarium</i> (Roxb.) Dalz.	Euphorbiaceae	Bhauri, Kakra	0.9
	<i>Hemidesmus indicus</i> (L.) R. Br.	Asclepiadaceae	Anantamul	1.1
	<i>Holarrhena pubescens</i> Wall. ex G. Don	Apocynaceae	Kurchi	2.1
	<i>Ichnocarpus frutescens</i> (L.) W.T.	Apocynaceae	Kalilat, Dudhilata	1.1

	Aiton			
	<i>Ixorea arborea</i>	Rubiaceae	Ban Gandharaj	2.4
	<i>Lagerstroemia microcarpa</i> Wall.	Lythraceae	Jarul, Sidha	1.7
	<i>Lannea coromandelica</i> (Houtt.) Merr.	Anacardiaceae	Jiyal	1.8
	<i>Lygodium flexuosum</i> (L.) Sw.	Lygodiaceae	Berajal	1.5
	<i>Madhuca longifolia</i> (Konig.) Macbr.	Sapotaceae	Mahul	3.2
	<i>Mallotus philippensis</i> (Lam.) Muell.- Arg.	Euphorbiaceae	Sinduri	1.1
	<i>Mangifera indica</i> L.	Anacardiaceae	Aam	0.2
	<i>Melothria heterophylla</i> (Lour.) Cogn.	Cucurbitaceae	Ban Kudari, Kudari	2.1
	<i>Meyna spinosa</i> Roxb. ex Link	Rubiaceae	Maynakanta	2.1
	<i>Mimosa rubricaulis</i> Lam.	Mimosaceae	Chirchirekanta	1.0
	<i>Morinda citrifolia</i> L.	Rubiaceae	Daruharidra, Nani	1.2
	<i>Mucuna pruriens</i> (L.) DC.	Fabaceae	Alkush	1.9
	<i>Nyctanthes arbour-tristis</i> L.	Oleaceae	Sefali	0.6
	<i>Olax scandens</i> Roxb.	Oleaceae	Koko-arua	0.4
	<i>Parthenium hysterophorus</i> L.	Asteraceae	Gajarghas	0.7
	<i>Phoenix acaulis</i> Roxb.	Arecaceae	Ban Khejur	0.1
	<i>Polygala crotalarioides</i> Buch.-Ham. Ex DC.	Polygalaceae	Golabi	0.1
	<i>Pothos scandens</i> L.	Araceae	Hatilata, Sunat	0.1
	<i>Pterocarpus marsupium</i> Roxb.	Fabaceae	Piyasal, Bijasal	1.0
	<i>Randia dumetorum</i> (Retz.) Poir	Rubiaceae	Maynaphal, Madanphal	1.0
	<i>Schleichera oleosa</i> (Lour.) Oken	Sapindaceae	Kusum	2.1
	<i>Semecarpus anacardium</i> L.	Anacardiaceae	Vela	1.0
	<i>Shorea robusta</i>	Dipterocarpaceae	Sal	4.9

	Gaertn. f.	carpaceae		
	Smilax zeylanica L.	Smilacaceae	Kumari	1.1
	Streblus asper Lour.	Moraceae	As Sheora	0.2
	Symplocos racemosa Roxb.	Syplocaceae	Divyoushu dhi, Lodhra	0.4
	Syzygium cumuni (L.) Skeels	Myrtaceae	Kalo Jam	0.9
	Terminalia bellirica (Gaertn.) Roxb.	Combretaceae	Bahera	1.8
	Terminalia chebula Retz.	Combretaceae	Hartuki	1.1
	Terminalia crenulata (Heyne) Roth	Combretaceae	Asan	0.6
	Thespesia lampas (Cav.) Dalzell & A. Gibson	Malvaceae	Bankapasi, Ban Paraspipul	0.7
	Urena lobata L.	Malvaceae	Banokra, Nageji, jangli Ghagra, Belaz-gota	0.4
	Ventilago denticulate Willd.	Rhamnaceae	Pappili, Pitti	
	Vernonai anthelmentica (L.) Willd.	Asteraceae	Somraj	0.9
	Ziziphus jujube Mill.	Rhamnaceae	Kul, Tak Kul	1.0
	Ziziphus oenoplea (L.) Mill.	Rhamnaceae	Kankul	2.5

N.B.: Total IVI 100 out of 300 due to compilation of all IVI from all Quadrats, this is based on percentage of IVI on the basis of mean in all quadrats from all sites though scientifically it is partially fit, biasness persist which need later study on the basis of herbs, shrubs and tree wise in all specific sites though for analytical respect the vegetation study needs a general data for clarification of status of species from a entire forest domain.

Here, plants are used widely for different purposes. The most widely used purposes are green leaves for carrying some items, thali or container for ready use, twigs and flowers for medicinal use, sal twigs for tooth brush, red ant for food, corms for medicinal purpose as well for the preparation of tablets used to ferment the local beer (haria). Dry twigs are used for fuel wood. Ripe fruits used readily for economic

purpose. Green twigs used for cattle. In town the twigs of sal, jiyal used to feed the goats in a red meat shop. The bunch of twigs (5-6 big sap lings) amount rupees 30/-(Indian) available daily to keep goats in a living condition. People of local kind use 'Parashi' to make the shed of their domestics. Kul and kankul including Mayna kanta are used to make the fencing of their own garden. Mushrooms, red ants, ant eggs, local edible plant twigs are used widely for vegetable purpose and are being marketed in Lalgah hat (weekly market). Dry sal leaves are used directly or as a plate (thali) for various purposes. Green leaves of sal and latpalas used by grocery, pan stall, fish shop, in hotels and in vegetable shop to carry and hold articles. Some green fruits are used as vegetables (Table 2). As a whole the market demand of the Forest produces are high though the source of the product is diminishing day by day due to degradation of forest. Therefore, there is urgent need to start complete research on productivity (species wise) of the same site to manage the forest for near future. This would develop interest among local people to generate economic development by using local resource in a sustainable basis without hampering the local ecosystem in near future.

Table 2. Plant species in Forest of Lalgah used by people in various ways to solve the regular problems

Sl. No.	Kind of plant parts	Plants used
1	Bark	Neem, Kurchi, Olax, Kumbhi, Asan, Kalo jam.
2	Corms	Cissus, Talamuli.
3	Dry fruits	Hartiki, Asan, Bahera, Sal, Piyasal, Piyal, Kul, Boichi, Mahua.
4	Flowers	Kurchi, Sefali, Latpals, Dhaw, Kumbhi, Lal Simul, Atmochra.
5	Fruits	Bel, Kotbel, Kul, Kalojam, Gab, Kend, Piyal, Kusum.
6	Fuel wood	Sal, Piyal, Kurchi, Maynakanta, Madanphal, Kusum, Fig. 6
7	Green fruits	Hartiki, Bahera, Maul, Kul, Bel, Kotbel.
8	Green leaves	Sal, Parasi, Sinduri, Putli, Kusum, Maynakanta, Bot, Pakur.
9	Leaf fuel	Dry sal leaves, small twigs of Kurchi, Mahua etc.
10	Leaves	Sal, Croton, Ban Parespipul, Lat Palash.
11	Medicinal Herbs	Kurchi, Satamuli, Iswarmul, Khamalu, Ratlu, Kalmegh, Ramdantan.
12	Other plants	Bangandharaj, Seuli, Mushrooms (Sik chatu, Furki chatu, Ui Chatu)

		Fig. 4
13	Ripe fruits	Kalojam, Dumur, Khejur, Palas, Latpalas.
14	Roots	Satamuli, Iswarmul, Anantamul, Kumari or Ramdantan.
15	Seeds	Sal, Piyal, Anantamul,
16	Stem	Kalilat, Bridelia, Sal.
17	Stem and twigs	Parsi, kalilat, Khamalu, Chirchitkanta
18	Stem bark	Ampelocissus, Atang, Latpalas, Dela.
19	Tuberous roots	Satamuli, Cissus.
20	Weak stem	Malkagni, Atang, Fig. 3
21	Whole plants	Kalmegh, Hatikan, Talamuli, Somraj, Fern, Berajal, Ban Tulsi.



Figure 4. Climbers on sal tree near the metallic road of Lalgarh Forest, West Bengal



Figure 2. Lalgarh Raj Palace, Lalgarh, Jhargram (Former erstwhile Medinipur, West Bengal)



Figure 5. Mushroom (Sik chatu or Sal chatu) a valuable NTFP of Lalgarh Forest, Late June, 2017



Figure 3. Red lateritic sal (*Shorea robusta*) vegetation of Lalgarh, Jhargra, West Bengal, India



Figure 6. Edge of the Lalgarh Forest adjacent to Agricultural land, note that the soil was collected to make road, 2017



Figure 7. Fuel wood collected from forest in which maximum biomass covered from sal (*Shorea robusta*) species.



Figure 10. *Abelmoschus crinitus* Wall. (Beng.: Kalkasturi, Lata Kasturi, Mushakdan)-Oil an ingredient of incense stick.



Figure 8. Cock Fight in the sal Forest a local plea to protect Culture and heritage in Jungal Muhal, West Bengal.



Figure 11. *Martynia annua* L. (Beng. Baghnock)–Pedaliaceae, Blooms flowers at the mid period of June, 2017at waste land nearer to forest of Lalgarh, Jhargram, Paschim Medinipur, West Bengal.

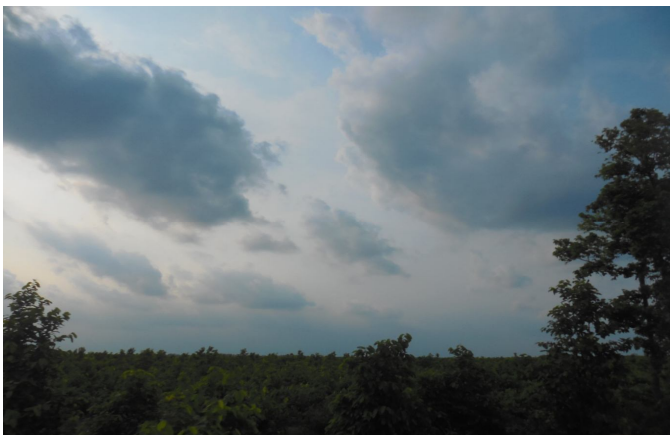


Figure 9. Vegetation spectrum in June beneath the cloudy sky in monsoon at Llalgarh, Jhargram, West Bengal.

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