

Angiospermic Climbing Plants Diversity in Jhargram District, West Bengal with Their Flowering-Fruiting Periods

Paper Submission: 10/10/2020, Date of Acceptance: 25/10/2020, Date of Publication: 26/10/2020



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Abstract

The present investigation of climbing plants in the flora of Jhargram district reflects the diversity of 98 species (dicots 90 and monocots 8) under 76 genera (dicots 72 and monocots 4) and 31 families (dicots 27 and monocots 4). The ratio of dicots and monocots species is 11.25:1 and family is 6.75:1. The highest number of species recorded in the family Cucurbitaceae (19). Out of 98 species, 51 species are twiners, 29 species are tendril climbers, 6 species are scramblers, 5 species are lianas, 4 species are hook-climbers, 2 species are ramblers and 1 species is root-climber. There are three rare climbers (*Bauhinia vahlii*, *Celastrus paniculatus* and *Solena amplexicaulis*) have been recorded from this area. Out of recorded species few of them are considered as potential weeds, viz. *Lantana camara*, *Mikania micrantha*, *Mimosa pudica*, *Passiflora foetida*, *Pergularia daemia*, *Tragia involucrata* and *Trichosanthes cucumerina*. From biodiversity point of view, the vegetation survey is very much important for the formulation of database from this area which ultimately can be utilised for the researchers, plants explorers etc. for their further studies. Study of flowering and fruiting periods (phenology) is one of the most important phenomena in the life of a plant because it provides about the patterns of plant growth and development along with the effects of environmental factors over it. Regarding the pollinations type, entomophilous is the highest (84.69 %) followed by anemophilous (10.20%) and amphiphilous (5.10%). The main objectives of the present study formulation of database of the diversity of the angiospermic climbers along with records of their flowering fruiting periods.

Keywords: Angiospermic Climbers, Diversity, Flowering & Fruiting Periods, Jhargram District.

Introduction

Generally climbers are considered as weak plants and they are usually well adopted to grow in forests in the shade of tall trees as they are able to utilise the available light while the expenditure of material in forming a strong stem is avoided (Gangulee *et al.*, 1984). Based on the mode of twisting climbers are of two types viz. dextrorse and sinistrorse (Noltie, 1994). On the basis of stem climbers are categorised into two types i.e. vine and lianas (Cabelle, 1998). Herbaceous twiners are common in the family Convolvulaceae. The tendril climbers are very much common in the family Cucurbitaceae and Vitaceae. On the basis of the modifications of plant organs, climbers are of different types as twiners, tendril climbers, hook-climbers, lianas, root-climbers including ramblers and scramblers (Darwin, 1867; Agarwal, 2013).

Review of Literature

From distribution point of view climbers are very common in tropical and subtropical countries in the world but better distributed in tropics than temperate regions (Givnish & Vermeij, 1976; Grubb, 1977; Putz, 1984; Gentry, 1991; Richards, 1996). But the frequencies of climbing plants are increasing due to climate change (Malhi & Wright, 2004).

So many works have been done on climbing plants covering different aspects throughout the world (Bor & Raizada, 1982; Das & Ghosh, 1982; Samanta & Das, 1996; Samanta *et al.*, 1999; Samanta, 2000; Samanta & Das, 2002, 2009; Muthumperumal & Parthasarathy, 2009; Jangid & Sharma 2011; Jayakumar & Nair, 2013; Panda & Samanta,

2012, 2014; Patel *et al.*, 2013; Samanta, 2014; Ghosh & Pandey, 2014a; Barooah & Ahmed, 2014; Samnata & Panda, 2014b; Suthari *et al.*, 2014; Gianoli *et al.*, 2015; Singh *et al.*, 2015; Jena *et al.*, 2018; Rani *et al.*, 2019; Kumar E & Jaleel V, 2019). From intensive literature surveys it was observed that most of the works were done from the vegetation point of view except some noted works on climbers from West Bengal (Sanyal, 1973; Samanta & Das, 1995; Das *et al.*, 2010a, 2010b; Samanta & Panda, 2014a; Bandopadhyaya & Mukherjee, 2010). 64 medicinal climbers from district town of Paschim Medinipur have recorded by (Samanta & Biswas, 2009). Later Samanta & Panda, 2011 has recorded 108 angiospermic climbers from undivided Midnapore districts. Except some published works of Das & Chanda, 1987; Kundu *et al.*, 1981; Samanta, 2006 on flowering and fruiting calendar of climbers from hilly regions of West Bengal, no such publications were recorded from plains.

Works on angiospermic climbing plants from Jhargram district has not yet been published still now. So the present attempt has been taken to record the comprehensive data regarding the diversity of angiospermic climbers in general along with flowering and fruiting periods in particular.

Materials and methods

Study Area and Field Survey

For the present study, Jhargram district of West Bengal was selected as study area. Formerly the sub-division Jhargram of Paschim Medinipur district was bifurcated as separate 22th district Jhargram in West Bengal in the year 2017. The district of Jhargram has a latitude 22°26'13.33"N and longitude 86°59'32.77"E and total geographical area is 3037 sq km. The district is demarcated by the state Odisha and Jharkhand in the west; Bankura and

Results and Discussion

Table -1: List of climbing species along with their local name (s), Types Of Climbers, Frequency, Status Flowering Periods, Mode of Pollination and Fruiting Periods; Abbreviations & symbols used: Mode of Pollination: A= Anemophilous, Am= Amphiphilous, E= Entemophilous; Months: Jan=January, Feb= February, Mar=March; Apr= April, Jun= June; Jul=July; Aug= August; Sep=September; Oct=October, Nov=November Dec= December; '-' Not recorded.

Name of the plant	Family	Local name (s)	Type of climbers	Frequency; Status	Flowering period	Mode of pollination	Fruiting period
MAGNOLIOPSIDA							
<i>Abrus precatorius</i> L.	Fabaceae	Lal Kunch	Twiner	Less common; Wild	Sept-Oct	E	Nov-Dec
<i>Acacia sinuata</i> (Lour.) Merr.	Fabaceae	Bonritha	Hook-climber	Less common; Wild	Jan-Jul	E	Sep-Feb
<i>Adenocalymma alliaceum</i> (Lamk.) Miers	Bignoniaceae	Rasunlata	Twiner	Less common; Cultivated	Oct-Dec	E	Dec-Feb
<i>Aganosma dichotoma</i> (Roth) K. Schum.	Apocynaceae	Malati	Twiner	Less common; Cultivated	Jul-Oct	E	Oct-Feb
<i>Ampelocissus latifolia</i> (Roxb.) Planch.	Vitaceae	Kamar lata	Tendrill climber	Common ; Wild	Aug-Oct	E	Oct-Jun
<i>Antigonon leptopus</i> Hook. & Arn.	Polygonaceae	Raillata	Twiner	Less common; Wild	Aug-Nov	E	Dec-Jan
<i>Argyreia nervosa</i> (Burm.f.) Bojer	Convolvulaceae	Guguli, Bij Tarak	Twiner	Less common; Wild	Jul-Oct	E	Oct-Dec
<i>Aristolochia indica</i> L.	Aristolochiaceae	Iswarmul	Twiner	Less common; Wild	Jul-Sep	E	Oct-Feb
<i>Artabotrys hexapetalous</i> (L.f.) Bhandari.	Annonaceae	Kantali champa	Hook climber	Less common; Cultivated	Apr-Aug	E	Sep-Jan

some parts of Purulia in the north and the major parts of south and east parts of Paschim Medinipur. The River Dulong flows from west to east touching the Kanak Durga Temple and stretches through the Jhargram district to Paschim Medinipur district. The soil of this district is mainly lateritic with to some pockets are alluvial type. The vegetation is mainly of sal dominated dry deciduous forest. The temperature varies 32.5° C to 44° C in the summer and comes down to 9 °C during winter. The average annual rainfall is 1400 mm.

The specimens/data were collected from different parts of Jhargram district in different seasons [premonsoon (February to May); monsoon (June-September) and post monsoon (October-January) to record the flowering and fruiting periods] and for the preparation of comprehensive database of angiospermic climbers. The collected specimens were thoroughly identified with the help of literatures (Hooker, 1872-1897; Prain, 1903). Field and herbarium methods were followed according to Jain & Rao, 1977. Finally these specimens were confirmed at Central National Herbarium (CAL). Now these voucher specimens were deposited at the Ramnagar College Herbarium. For updating species names the website of The Plant List (<http://www.plantlist.org>) was consulted. The list of accepted plant names were arranged alphabetically (Table-1) along with their family, local name (s), type of climbers, frequency, status, flowering periods, mode of pollination and fruiting periods were presented in tabulated form.

Objective of the Study

In the present work, attempt has been taken to document the diversity and flowering -fruiting periods of the climbing plants of Jhargram district of West Bengal.

Asian Resonance

<i>Basella alba</i> L.	Basellaceae	Pui	Twiner	Common; Cultivated	Sep-Oct	E	Dec-Feb
<i>Bauhinia vahlii</i> Wight & Arn.	Fabaceae	Chihurlata	Liana	Rare ;Wild	Apr-Sep	E	Oct-Feb
<i>Benincasa hispida</i> (Thunb.) Cogn.	Cucurbitaceae	Chalkumara	Tendrill climber	Common ; Cultivated	May-Dec	E	Aug-Dec
<i>Boerhavia diffusa</i> L.	Nyctaginaceae	Punarnava	Rambler	Abundant; Wild	Jun-Aug	E	Sep-Dec
<i>Butea superba</i> Roxb.	Fabaceae	Latpalash	Liana	Less common; Wild	Mar-Aug	E	Sep-Oct
<i>Caesalpinia bonduc</i> (L.) Roxb.	Fabaceae	Nata; Lata	Scrambler	Less common ; Wild	Aug-Sep	E	Oct-Dec
<i>Cajanus goensis</i> Dalzell.	Fabaceae	Ban Bichati	Twiner	Less common ; Wild	Oct-Nov	E	Nov-Dec
<i>C. scarabaeoides</i> (L.) Thouars	Fabaceae	Banarahar	Twiner	Less common; Wild	Aug-Oct	E	Oct-Apr
<i>Capparis zeylanica</i> L.	Capparaceae	Kalokera	Scrambler	Less common; Wild	Mar-Sep	E	Sep-Oct
<i>Cardiospermum halicacabum</i> L.	Sapindaceae	Shibjhul; Latapatkori	Tendrill climber	Abundant; Wild	Apr-Sep	E	Dec-Jan
<i>Cayaponia laciniosa</i> (L.) Jeffery	Cucurbitaceae	Mala	Tendrill climber	Common; Wild	Apr-Aug	E	Sep-Dec
<i>Cayratia pedata</i> (Lam.) Gagnep.	Vitaceae	Goalilata	Tendrill climber	Abundant; Wild	Aug-Nov	E	Nov-Dec
<i>C. trifolia</i> (L.) Domin	Vitaceae	Amal-lata	Tendrill climber	Less common; Wild	Apr-Sep	E	Oct-Dec
<i>Celastrus paniculatus</i> Willd.	Celastraceae	Kujri; Malkgari	Twiner	Rare; Wild	Apr-Aug	E	Oct-Jan
<i>Centella asiatica</i> (L.) Urb.	Apiaceae	Thankuni; Tholkuri	Rambler	Common; Wild	Jul-Sep	E	Oct-Jan
<i>Cissampelos pareira</i> L.	Menispermaceae	Laghupatha	Twiner	Abundant; Wild	May-Sep	E	Sep-Nov
<i>Cissus adnata</i> Roxb.	Vitaceae	Panialata	Liana	Less common; Wild	Mar-Aug	E	Aug-Sep
<i>C. quadrangularis</i> L.	Vitaceae	Harbhanga/Harj ora	Tendrill climber	Common; Wild	May-Aug	E	Sep-Nov
<i>Citrulus lanatus</i> (Thunb.) Matsum. & Nakai	Cucurbitaceae	Tormuj	Tendrill climber	Less common; Cultivated	Apr-Jun	E	Jun-Jul
<i>Clitoria ternatea</i> L.	Fabaceae	Aparajita	Twiner	Common;Wild	Mar-Aug	E	Jul-Dec
<i>Coccinea grandis</i> (L.) Voigt	Cucurbitaceae	Telakucha	Tendrill climber	Abundant; Wild	Mar-Oct	E	Sep-Dec
<i>Cocculus hirsutus</i> (L.) W. Diels	Menispermaceae	Daipata	Twiner	Abundant; Wild	Jul-Aug	E	Sep
<i>Combretum album</i> Pers.	Combretaceae	Alang	Hook climber	Abundant; Wild	May-Sep	Am	Nov-Jan
<i>Cryptolepis dubia</i> (Burm.f.) M.R.Almeida	Asclepiadaceae	Karilata	Twiner	Less common; Wild	May-Jun	E	Aug-Feb
<i>Cucurbita maxima</i> Duchesne	Cucurbitaceae	Mistikumra	Tendrill climber	Less common; Cultivated	Mar-Jun	E	May-Aug
<i>C. pepo</i> L.	Cucurbitaceae	Kumara	Tendrill climber	Common; Cultivated	Jul-Aug	A	Aug-Oct
<i>Cucumis melo</i> L.	Cucurbitaceae	Kharbuz	Tendrill climber	Less common; Cultivated	May-Jul	E	Jul-Oct
<i>C. sativa</i> L.	Cucurbitaceae	Sasa	Tendrill climber	Less common; Cultivated	May-Aug	E	Jul-Oct
<i>Cuscuta reflexa</i> Roxb.	Cuscutaceae	Swamalata	Twiner	Abundant; Wild	Aug-Nov	E	Nov-Apr
<i>Dalbergia volubilis</i> Roxb.	Leguminosae	Latmurga	Liana	Less common; Wild	Aug-Oct	E	Nov-Jan
<i>Dregea volubilis</i> (L.f.) Benth. ex Hook.f.	Asclepiadaceae	Titakunja	Twiner	Less common; Wild	Apr-Oct	E	Oct-Dec
<i>Gymnema sylvestre</i> (Retz.) R. Br. ex Sm.	Asclepiadaceae	Gurmar/Meshsh ringa	Twiner	Common; Wild	Aug-Oct	E	Oct-Mar
<i>Hemidesmus</i> (L.) <i>indicus</i> R.Br.ex Schult.	Asclepiadaceae	Anantamul	Twiner	Common; Wild	Sep-Nov	E	Nov-Feb
<i>Holmskioldia sanguinea</i> Retz.	Verbenaceae	Kapni	Scrambler	Less common; Cultivated	Oct-Jan	A	Feb-Apr
<i>Ipomoea aquatica</i> Forssk.	Convolvulaceae	Kalmisak	Twiner	Less common;	Jun-Oct	E	NR

				Wild			
<i>I. batatas</i> (L.) Lam.	Convolvulaceae	Ranga alu	Twiner	Less common; Cultivated	Oct-Nov	E	Oct-Dec
<i>I. nil</i> (L.) Roth	Convolvulaceae	Kaladana	Twiner	Less common; Wild	Aug-Sep	E	Oct-Feb
<i>I. purpurea</i> (L.) Roth	Convolvulaceae	Morning glory	Twiner	Common; Wild	July-October	E	Oct-Jan
<i>I. quamoclit</i> L.	Convolvulaceae	Tarulata	Twiner	Less common; Cultivated	August- October	E	Oct-Dec
<i>Jasminum sambac</i> (L.) Aiton	Oleaceae	Banbeli/ Mongra	Twiner	Less common; Cultivated	Apr-Jul	E	Jul-Aug
<i>Lablab purpureus</i> L.	Fabaceae	Mistikumra	Tendrill climber	Less common; Cultivated	Mar-Jun	E	May-Jun
<i>Lagenaria siceraria</i> (Molina) Standl.	Cucurbitaceae	Lau	Tendrill climber	Less common; Cultivated	Jun-Aug	E	Nov-Jan
<i>Lantana camara</i> L.	Verbenaceae	Bhutbhairabi	Scrambler	Abundant; Wild	Apr-Oct	E	Oct-Mar
<i>Lathyrus sativus</i> L.	Fabaceae	Khesari	Tendrill climber	Less common; Cultivated	Feb-Apr	E	Jun-Aug
<i>Luffa acutangula</i> (L.) Roxb.	Cucurbitaceae	Jhinga	Tendrill climber	Abundant; Wild	Sep-Oct	E	Nov-Dec
<i>L. cylindrica</i> (L.) M. Roem.	Cucurbitaceae	Parul/ Dhundul	Tendrill climber	Abundant; Wild	Jun-Nov	E	Nov-Dec
<i>Merremia tridentata</i> (L.) Hallier f.	Convolvulaceae	Prasarani	Twiner	Less common; Wild	Aug-Oct	E	Oct-Dec
<i>M. hederacea</i> (Burm.f.) Hallier f.	Convolvulaceae	Bilaikan	Twiner	Less common; Wild	Sep-Oct	E	Oct-Nov
<i>Mikania micrantha</i> Kunth	Asteraceae	Taralata	Twiner	Abundant; Wild	Mar-Apr	Am	Nov-Dec
<i>Mimosa pudica</i> L.	Fabaceae	Lajjabati	Scrambler	Common; Wild	Jan-Oct	E	Nov-Dec
<i>Momordica charantia</i> L.	Cucurbitaceae	Karala/ Uccha	Tendrill climber	Common; Cultivated	Jul-Oct	E	Sep-Nov
<i>M. chochinchinensis</i> (Lour.) Spreng.	Cucurbitaceae	Golkakra	Tendrill climber	Less common; Cultivated	Aug-Oct	E	Nov-Dec
<i>M. dioica</i> Roxb. ex Willd.	Cucurbitaceae	Shikalla/ Kakrol	Tendrill climber	Less common; Cultivated	Jun-Aug	E	Sep-Oct
<i>Mucuna pruriens</i> (L.) DC.	Fabaceae	Alkushi	Twiner	Less common; Wild	Sep-Oct	E	Nov-May
<i>Mukia maderaspatana</i> (L.) M. Roemer	Cucurbitaceae	Agmukhi	Tendrill climber	Common; Wild	Jul-Oct	E	Nov-Dec
<i>Operculina turpenthum</i> (L.) Silva Manso	Convolvulaceae	Dudhkalmi	Twiner	Less common; Wild	Jul-Oct	E	Nov-Jan
<i>Paederia foetida</i> L.	Rubiaceae	Gandal pata	Twiner	Less common; Wild	Jul-Oct	E	Oct-Dec
<i>Passiflora edulis</i> Sims	Passifloraceae	Passion fruit	Tendrill climber	Less common; Wild	Mar-Jun	E	Jul-Aug
<i>P. foetida</i> L.	Passifloraceae	Begambahar (wild)	Twiner	Less common; Wild	Aug-Sep	E	Dec-Jan
<i>Pergularia daemia</i> (Forssk.) Chivo.	Asclepiadaceae	Dudhlata	Twiner	Abundant; Wild	Sep-Oct	E	Oct-Jan
<i>Piper betle</i> L.	Piperaceae	Pan	Root- climber	Less common; Cultivated	Jul-Aug	A	Nov-Feb
<i>Quirivelia frutescens</i> (L.) M.R. Almeida & S. M. Almeida	Apocynaceae	Shyاملata /Siamalata	Twiner	Less common; Wild	Oct-Nov	E	Jan-Mar
<i>Quisqualis indica</i> L.	Combretaceae	Madhunalata	Hook climber	Common; Wild	Apr-Aug	Am	Dec-Feb
<i>Rivea hypocrateriformis</i> (Desr.) Choisy	Convolvulaceae	Banpui	Twiner	Less common; Wild	Mar-May	E	May-Jun
<i>Solena amplexicaulis</i> (Lam.) Gandhi	Cucurbitaceae	Rakhalsasha	Tendrill climber	Rare; Wild	Jun-Aug	Am	Aug-Dec
<i>Stephania japonica</i> Miers	Menispermaceae	Nimukha	Twiner	Abundant; Wild	Sep-Oct	A	Oct-Feb

<i>Teramnus labialis</i> (L.f.) Spreng.	Fabaceae	Mashani	Twiner	Less common; Wild	Oct-Nov	E	Nov-Feb
<i>Tiliacora racemosa</i> Colebr.	Menispermaceae	NR	Twiner	Common; Wild	May-Sep	E	Oct-Dec
<i>Tinospora cordifolia</i> (Willd.) Hook.f. & Thoms.	Menispermaceae	Gulanca	Twiner	Abundant; Wild	Jun-Aug	E	Sep-Feb
<i>T. sinensis</i> (Lour.) Merr.	Menispermaceae	Padmagulancha	Twiner	Less common; Wild	Jul-Aug	E	Oct-Feb
<i>Tragia 94involucrata</i> L.	Euphorbiaceae	Bichuti	Twiner	Common; Wild	Mar-Aug	E	Nov-Jan
<i>Trichosanthes cucumerina</i> L.	Cucurbitaceae	Banchichinga	Tendrill climber	Less common; Wild	Jun-Aug	E	Sep-Oct
<i>T. dioica</i> Roxb.	Cucurbitaceae	Patol	Tendrill climber	Less common; Wild	Apr-Jul	E	Jun-Sep
<i>T. tricuspidata</i> Lour.	Cucurbitaceae	Makal	Tendrill climber	Less common; Wild	Jul-Sep	E	Oct-Dec
<i>Vallis solanacea</i> (Roth) Kuntze	Apocynaceae	Haparnali	Twiner	Less common; Wild	Apr-May	E	Jun-Sep
<i>Ventilago denticulata</i> Willd.	Rhamnaceae	Ruktupita	Liana	Common; Wild	Sep-Dec	Am	May-Jun
<i>Vigna trilobata</i> (L.) Verdc.	Fabaceae	Mugani	Twiner	Less common; Wild	Aug-Oct	E	Oct-Dec
<i>V. unguiculata</i> (L.) Walp.	Fabaceae	Ban-moog	Twiner	Less common; Wild	July-Oct	E	Oct-Dec
<i>Vincetoxicum indicum</i> (Burm.f.) Mabb.	Asclepiadaceae	Antamul	Twiner	Less common; Wild	Oct-Nov	E	Nov-Feb
<i>Vitis vinifera</i> L.	Vitaceae	Angur Phal	Tendrill climber	Less common; Wild	Oct-Dec	E	Dec-Apr
<i>Ziziphus oenoplia</i> Mill.	Rhamnaceae	Shiakul	Scrambler	Common; Wild	Apr-Oct	E	Oct-Dec
LILIOPSIDA							
<i>Asparaguss adscendens</i> Roxb.	Asparagaceae	Maha satbari	Twiner	Less common ; Cultivated	Sep-Oct	A	Oct-Nov
<i>A. racemosus</i> Willd.	Asparagaceae	Satamuli	Twiner	Less common; Wild	Aug-Sep	A	Oct-Jan
<i>Dioscorea alata</i> L.	Dioscoreaceae	Khamalu/ Chuprialu	Twiner	Common; Wild	Aug-Sep	A	Oct-Dec
<i>D. bulbifera</i> L.	Dioscoreaceae	Ban alu	Twiner	Common; Wild	Sep-Oct	A	Oct-Dec
<i>D. esculenta</i> (Lour.) Burkill	Dioscoreaceae	Kantaalu	Twiner	Less common	Oct-Nov	A	Nov-Dec
<i>D. pentaphylla</i> L.	Dioscoreaceae	Shuoralu	Twiner	Less common; Wild	Sep-Nov	A	Nov-Feb
<i>Gloriosa superba</i> L.	Liliaceae	Ulatchandal	Tendrill climber	Common; Wild	Aug-Sep	E	Oct-Dec
<i>Smilax zeylanica</i> L.	Smilacaceae	Kumarika	Tendrill climber	Less common; Wild	Apr-Jun	E	Jul-Oct

Table-2: Taxonomic breakup of the climbers of Jhargram district

Plant groups	Families	Genera	Species
Magnoliopsida	27	72	90
Liliopsida	4	4	8
TOTAL	31	76	98

Table-3: Types of climbers and their numbers

Types of climbers	Total number
Twiners	51
Tendrill climbers	29
Liana	5
Hook-climbers	4
Ramblers	2
Scramblers	6
Root-climber	1
TOTAL	98

Fig.-1: Graphical representation of flowering and fruiting calendars of the angiospermic climbers of Jhargram district of West Bengal

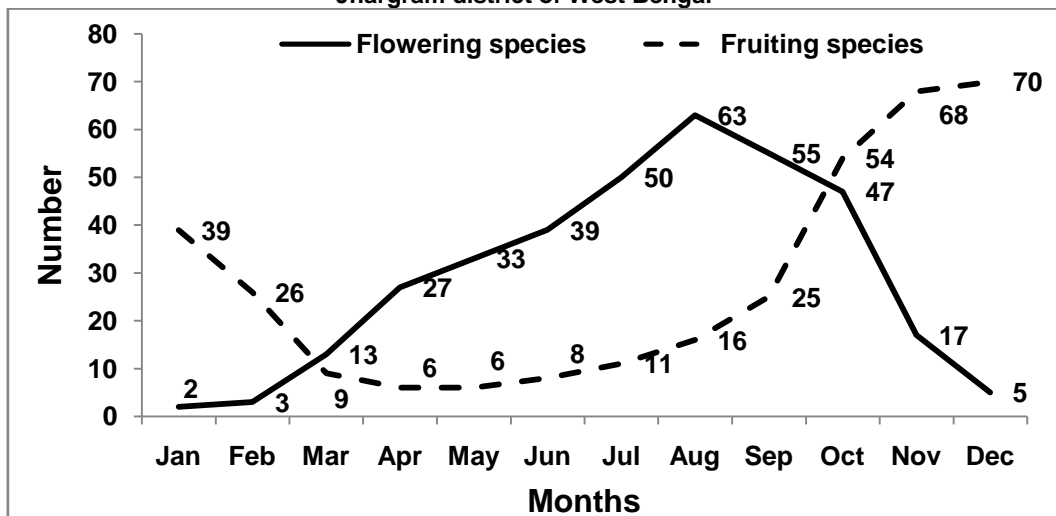


Fig.-2: Analysis of the pollination types of the angiospermic climbers of Jhargram district of West Bengal. Recent investigation of climbing plants in the flora of Jhargram district reflects the diversity of 98 species (dicots 90 and monocots 8) under 76 genera (dicots 72 and monocots 4) and 31 families (dicots 27 and monocots 4) [Table-1].

Pollination types	Total no of species	Monthwise distribution of flowering climbers											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Anemophilous	10	1	-	-	-	-	-	2	4	6	6	3	1
%	10.20	4.54	-	-	-	-	-	9.09	18.18	27.27	27.27	13.63	4.54
Entemophilous	83	1	3	12	25	31	36	45	56	47	40	13	3
%	84.69	0.32	0.96	3.84	8.01	9.93	11.53	14.42	17.94	15.06	12.82	4.16	0.96
Amphiphilous	5	-	-	1	2	2	3	3	3	2	1	1	1
%	5.10	-	-	5.26	10.52	10.52	15.78	15.78	15.78	10.52	5.26	5.26	5.26
Total	98	2	3	13	27	33	39	50	63	55	47	17	5
%	100	4.86	0.96	9.10	18.53	20.45	27.31	39.29	51.82	52.85	45.35	23.05	10.86

With the keen review it was revealed that out of 98 species, 51 species are twiners, 29 species are tendril climbers, 6 species are scramblers, 5 species are lianas, 4 species are hook-climbers, 2 species are ramblers and 1 species is root-climber [Table-3].

From frequency distribution point of view most of the climbers are abundant, common and less common from this area. Out of which few climbers were considered as rare climbers (*Bauhinia vahlii*, *Celastrus paniculatus* and *Solena amplexicaulis* (Table-1).

From the observation some of the species were found to be potential weeds, viz. *Lantana camara*, *Mikania micrantha*, *Mimosa pudica*, *Passiflora foetida*, *Pergularia daemia*, *Tragia involucrata* and *Trichosanthes cucumerina*. (Table-1).

Regarding the flowering and fruiting periods, 3 seasons have been selected i.e. Pre-monsoon, Mon-soon and Post-monsoon. From this discussion (Fig.-1) it was found that in premonsoon season total 76 species show flowering activities, out of which 3 species in February, 13 species in March, 27 species in April and 33 species in May. In the Mon-soon season there are total 207 species show flowering activities, out of which 39 species in June, 50 species in July, 63 species in August and 55 species in September. In Post-monsoon season total 81 species show flowering activities, out of which 47 species in

October, 17 species in November, 15 species in December and 2 species in January. From the above observation it was concluded that the species show highest flowering activities in Mon-soon season (in both the months August and September) followed by pre-monsoon (in between April and May) and post-monsoon (in between October and November).

Regarding fruiting periods from the above discussion (Fig.-1) it was found that in the pre-monsoon season total 47 species show fruiting activities, out of which 26 species in February, 9 species in March, 6 species in each both the months of April and May. There were total 60 species show fruiting activities in the mon-soon season, out of which 8 species in the June, 11 species in the July, 16 species in the August and 25 species in the September. In the same manner total 231 species show fruiting activities in post-monsoon season, out of which 54 species in October, 68 species in November, 70 species in December and 39 species in January. From the above discussion (Fig.-1) it can be concluded that species showing highest fruiting periods in post-monsoon season (in between months of November and December) followed by mon-soon and pre-monsoon seasons in between September and February).

Regarding the pollinations type, entemophilous is the highest (84.69 %) followed by

anemophilous (10.20%) and amphiphilous (5.10%) [Fig.-2].

Conclusion

Climbers play a significant role in forest ecosystem (Bongers *et al.*, 2002). Climbers are also the important part of vegetation. This vegetation is very much important from biodiversity point of view. Biodiversity are the major source of raw materials for the stability of the ecosystem, source of food, fodder, herbal medicines etc. The vegetation structure of study area is gradually changing due to anthropogenic activities as well as over-exploitation of bio-resources, which in turn threatens the existence of many rare and vulnerable species. Grazing is also one of the most prominent factors which in turn endangered the normal growth and existence of these plants. In the vegetation structure mainly the climbers are very much sensitive to the changes in their habitat structure and ultimately eliminated first from their habitat structure. This indicators concern us about their further existence in their habitat. So care should be taken on priority basis in view of the conservation of these dwindling, disappearing, keystone species as well as sustainable development for the future generation.

Acknowledgement

Author is very much thankful to Dr. Rajendra Prasad De, Assistant Professor of Botany, Government General Degree College Mohanpur for his constant as well as constructive suggestions for the preparation of this paper.

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