

## FRUITING PHENOLOGY OF A SCRUB FOREST IN THIRUPORUR, EASTERN GHATS, INDIA

R. Aruna<sup>1\*</sup>, P. Balasubramanian<sup>2</sup>

<sup>1</sup>Assistant Professor, PG and Research Department of Botany, Thiagarajar College, Madurai, India.

<sup>2</sup>Principal Scientist, Division of Landscape Ecology, Salim Ali Centre for Ornithology and Natural History, Anaikatty P.O, Coimbatore, India.

E-mail address: arsb0t@gmail.com

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**ABSTRACT.** This paper describes the fruiting phenology of 110 individuals of woody species belonging to 22 taxa (21 species, 1 variety) belonging to 15 families including 2 species of figs in a scrub forest, Thiruporur, Eastern Ghats. Fruiting peak was observed during July 2009 with 11 species in fruiting, a dip was observed during March 2009 where only 2 species were in fruiting. Season wise fruiting peak was observed during South-west and North-east Monsoon while the dip was during summer.

### 1. INTRODUCTION

Phenology is the study of relationship between climatic factors and periodic phenomena in organisms. Periodic behaviour of plants in tropical environments has received much attention in recent years. Tropical forests with their high level of species diversity, display phenological events such as leaf drop, leaf flushing, flowering and fruiting, etc. in relation to time and space [1]. Study of such events is useful in evolving proper management strategy as well as better understanding of natural forest regeneration potential and community level interactions [2]. The study of plant phenology provides knowledge about the pattern of plant growth and development as well as the effects of environment and selective pressures on flowering and fruiting behavior [3].

In India the phenology of tree species has been studied in the subtropical forests in north-eastern region [4, 5]. Knowledge of fruiting phenology is of central importance for conservation management generally, but is of special value in tropical forests which support a diversity of fruit-dependent species [6]. The fruiting phenology of scrub forest in Eastern Ghats region is less understood. The present work aims to document the phenological diversity of fruiting of scrub forest in Eastern Ghats.

### 2. STUDY AREA

Study on scrub forest observation was made in Thiruporur, Kancheepuram district in Eastern Ghats. Kancheepuram district is situated on the northern East Coast of Tamil Nadu and is adjacent by Bay of Bengal and Chennai city and is bounded in the west by Vellore and Thiruvannamalai district, in the north by Thiruvallur district and Chennai district, in the south by Villuppuram district in the east by Bay of Bengal. It lies between 11° 00' to 12° 00' North latitudes and 77° 28' to 78° 50' East longitudes. The district has a total geographical area of 4, 43,210 hectares and coastline of 57 Kms. There are only a few hills of considerable elevation in the district. The southern part of Maduranthakam taluk contains small hills. The total forest area in the district is 23,586 hectares, it spread interior regions and around the district.

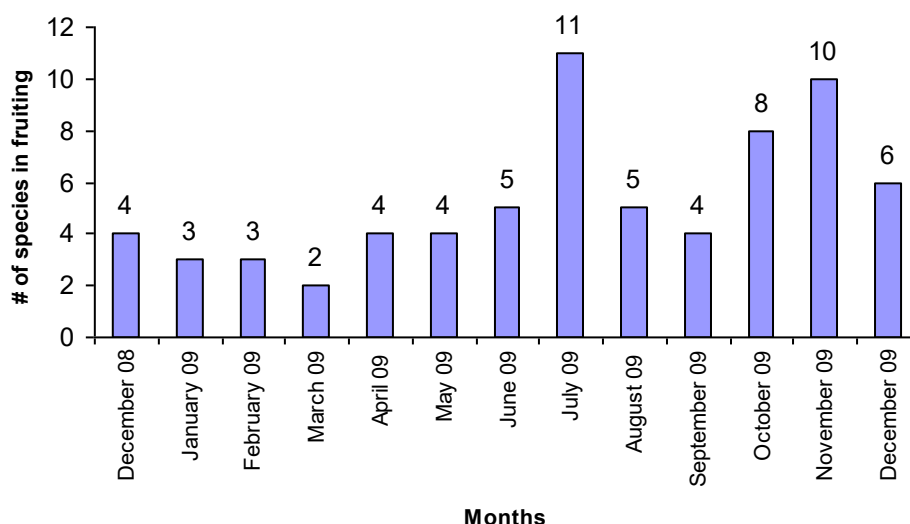
### 3. METHODOLOGY

A total of 110 individuals of woody species belonging to 22 taxa (21 species, 1 variety) belonging to 15 families, including 2 species of figs were marked with aluminum tags and observed

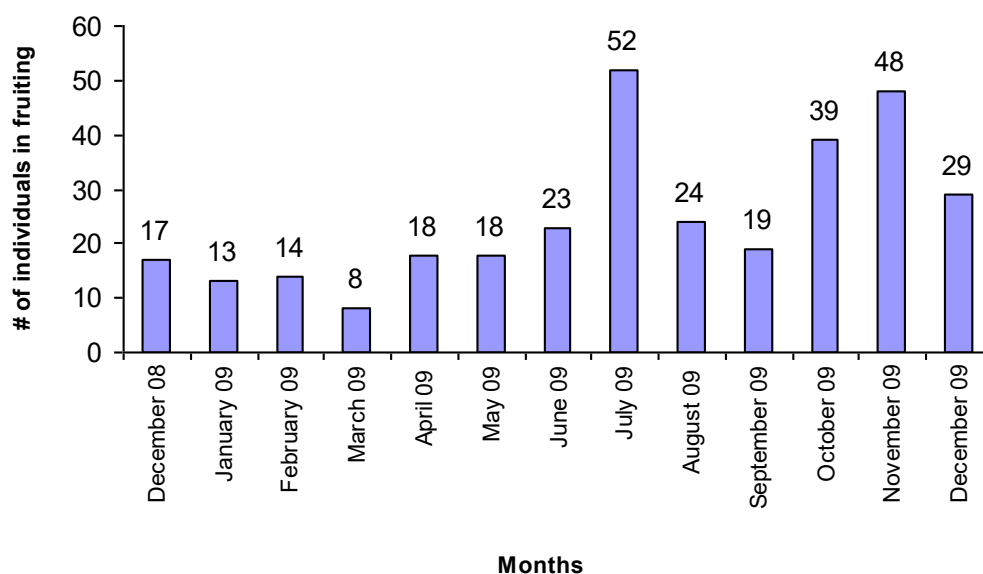
for phenology (Table 1). The phenology of fruit production was observed fortnight to assess the periodicity of fruiting. During the visit, percentage of fruit in the canopy was visually estimated and then the estimate was divided into percentage of ripe and unripe fruit, based primarily on colour changes indicating ripeness (Anggraini et al., 2000). The families studied were Anacardiaceae, Apocynaceae, Arecaceae, Cordiaceae, Ebenaceae, Euphorbiaceae, Loganiaceae, Meliaceae, Memecylaceae, Moraceae, Myrtaceae, Rhamnaceae, Rubiaceae, Rutaceae and Tiliaceae. Phenological observations were carried out for a continuous period of one year in the scrub forest.

#### 4. RESULTS

A fruiting peak was observed during July 2009 with 11 species in fruiting. Species that fruited during July include *Azadirachta indica*, *Diospyros ovalifolia*, *Ficus benghalensis*, *Ficus religiosa*, *Lannea coromandelica*, *Diospyros ferrea* var *buxifolia*, *Manilkara hexandra*, *Melia azedarach*, *Memecylon umbellatum*, *Strychnos potatorum* and *Syzygium cumini*. A dip was observed during March 2009 where only 2 species had fruits, viz. *Carissa spinarum* and *Ficus benghalensis* (Figure 1). The fruiting peak was noticed during July where 52 individuals (34.6%) were fruiting out of 150 individuals. A dip was noticed in March with 8 individuals (5.3%) in fruits (Figure 2).



**Fig.1.** Phenology of fleshy fruited plants in the tropical mixed dry deciduous forest. (# of species in fruiting)



**Fig. 2.** Phenology of fleshy fruited plants in the tropical mixed dry deciduous forest. (# of individuals in fruiting)

The phenology is discussed with regard to four seasons namely, Summer (March–May), South-west Monsoon (June–August), North-east Monsoon (September–November) and Post Monsoon (December–February). A peak was observed in South-west and North-east Monsoon and a dip in summer (Table 1). Fruiting schedule of fleshy fruited woody plants of the study area are shown in Table 2.

**Table 1.** Fruiting phenology of woody plants in different seasons, scrub forest.

Season	# species in fruiting		
	Trees	Shrubs	Total
South-west monsoon	10	2	12
Post monsoon	2	5	7
Summer	6	0	6
North-east monsoon	3	9	12

**Table 2.** Fruiting schedule of fleshy fruited species in scrub forest

S.No.	Name of the plant species	Summer	South-West Monsoon	North-East Monsoon	Post-Monsoon
1	<i>Azadirachta indica</i>	√	√		
2	<i>Benkara malabarica</i>			√	√
3	<i>Canthium dicoccum</i>			√	√
4	<i>Carissa spinarum</i>			√	√
5	<i>Carissa spinarum</i> var <i>microphylla</i>			√	
6	<i>Carmona retusa</i>		√		
7	<i>Diospyros ferrea</i> var <i>buxifolia</i>		√	√	
8	<i>Diospyros ovalifolia</i>	√	√	√	√
9	<i>Ficus benghalensis</i>	√	√	√	
10	<i>Ficus religiosa</i>		√		
11	<i>Fluggea virosa</i>			√	√
12	<i>Glycosmis cymosa</i>			√	
13	<i>Grewia hirsute</i>			√	√
14	<i>Lannea coromandelica</i>	√	√		
15	<i>Manilkara hexandra</i>	√	√		
16	<i>Melia azedarach</i>		√		
17	<i>Memecylon umbellatum</i>		√	√	
18	<i>Phoenix pusilla</i>	√			
19	<i>Scutia myrtina</i>			√	
20	<i>Strychnos potatorum</i>		√		
21	<i>Syzygium cumini</i>		√		
22	<i>Ziziphus oenoplia</i>				√

## 5. DISCUSSION

Fruiting peak was recorded during both South-west and North-east monsoon with 12 species each fruiting. [7] in a South African Coastal forest reported the fruiting peak (August-October) (March-May). Periods of fruit scarcity were found during the dry season in July and August and during the rainy season in November and December. In the tropics and subtropics, the production of fleshy fruits tends to be highest early in the wet season [8, 9].

Fruiting peak during wet season was reported from several tropical forests [10, 11]. [12] reported fruiting peak during September in subtropical forest at Manipur which coincides with the present study.[13] in Coromandel Coast of India in their phenological studies observed that fruiting during dry season was less when compared to wet season. [14] observed peak of fleshy fruits during post monsoon season, in the tropical dry evergreen forest. [15] observed a peak in fruiting during the South-west monsoon (21 species) and a dip during Post monsoon (9 species) in a tropical mixed dry deciduous forest, Western Ghats.

In the present study, *Ficus benghalensis* fruited during March- November; *Ficus religiosa* fruited during June – August. A study in the moist deciduous forest in Simlipal Biosphere Reserve [16] indicates that *Ficus benghalensis* bore fruits during April - June and December – February; *Ficus religiosa* fruited during June to October. In another study at a dry deciduous forest, Satlasana range forest, Gujarat [17] states that *Ficus benghalensis* was in fruiting during April, May and June, *Ficus religiosa* during April, October.

In contrast, *Ficus racemosa* and *Ficus religiosa* were found to be available year around in a deciduous forest and evergreen forest, Western Ghats [18]. According to a study [19] *Ficus benghalensis* bore fruits during September-November, *Ficus religiosa* during April - May at Goalpara, Assam. In some seasonal tropical forests, the number of animal-dispersed species peaks during the rainy season [20, 21]. In aseasonal tropical forests, such as those in Malaysia, fruiting occurs throughout the year; usually without defined peaks in fruit or frugivores abundance [22, 23].

In the present study, it was observed that summer had a dip with 6 species in fruits, but *Ficus benghalensis* was fruiting during this period of fruit scarcity and supported a large number of avian frugivores which clearly shows that *Ficus* is a keystone species in this study area. [24] reported peak fruiting in figs coincided with peak in non-fig fruiting in a wet evergreen forest site in Western Ghats which coincides with the present study in Eastern Ghats. *Carmona retusa*, *Glycosmis cymosa* and *Ziziphus oenoplia* were seasonal as the fruiting occurred only during one season i.e, South-west Monsoon, North-east Monsoon, Post-Monsoon respectively. Some species fruited during two or three seasons *Ficus benghalensis* bore fruits in three seasons.

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