



Phenological Behaviour of Some Tree Species of Pachamalai, Tamilnadu, India.

¹M.Johnson Gritto, ^{1*}V.Nandagopalan, ²A.Doss, ³A.Lakshmi Prabha

¹ PG & Research Department of Botany, National College, Tiruchirappalli, India.

² Post Graduate Department of Microbiology, Kamaraj College, Thoothukudi. India.

³ Department of Plant Sciences, Bharathidasan University, Tiruchirappalli. India.

*Corresponding author: V.Nandagopalan, E-mail: veenan05@gmail.com

Received: September 14, 2015, Accepted: November 10, 2015, Published: November 10, 2015.

ABSTRACT

The study of various periodic behaviours of the phenology has great significance because it not only provides knowledge about the plant growth pattern but also provides the inferences on the effect of environment and selective pressure on flowering and fruiting behaviour. In the present study, an attempt has been made to record such data regarding periods of leaf fall, flowering and fruiting. This was done for a period of one year for 50 species of course which were somehow having medicinal properties and it was carried out in the Pachamalai hills of Tiruchirappalli district, Tamilnadu. In the study the leaf fall peak period was found in last part of January - February, new foliage peak period in the month of February-March where as flowering and fruiting activity peak period was found during the month of March - April. The present paper will be helpful to give inferences in future whether the of climate change are giving pressure on the periodic behaviour of plant species. Changed phenological behaviour of plant species indicates the losing of plant diversity of the district in a critical level.

Key words: Phenology, Leaf fall, Flowering, Fruiting, Medicinal Plants, Environmental factors

INTRODUCTION

Medicinal plants will continue to play important roles in both rural and urban health care services as evident in the current number of herbal practitioners in India. Apart from their potential in pharmacological research and drug development they also serve as direct therapeutic agents or as sources of templates for the synthesis of drugs [1]. With increasing interest in herbal medicines worldwide, conservation of medicinal plants in natural ecosystem has assumed considerable importance. Conservation efforts including inventorying and documentation of the available medicinal plant diversity is the need of the hour. The study of phenology of medicinal plants in intact tropical ecosystems is also important if we are to learn more about the dynamics of medicinal plant species evolving in particular ecosystems, as well as how they may be excluded or successful in adjacent ecosystems; it is necessary to study first how species operate within the context of their respective environments. The life history of plant species involves seed germination, vegetative growth, flowering, fruit formation, seed maturation, leaf fall, seed dispersal and death. Environmental factors influence the phenological events can be recorded diagrammatically month wise and season wise and provide valuable information [2]. An attempt has been made to study the phenology and floristic ecology of select medicinal plant taxa occurring in Pachamalai Hills, Tiruchirappalli district, Tamilnadu state, India.

MATERIALS AND METHODS

Study Area: The study area in the Pachamalai hills, located in Tiruchirappalli District, Tamilnadu, India, situated 2000 to 3000 feet above mean sea level, lying between 78°31' East and 11°28' North and 11°10' South and 78°20' West latitude.

Observation: The phenological study was carried out for fifty species of medicinal plants of the district Tiruchirappalli, Tamilnadu. Observation was made on leaf fall, flowering, and fruiting at one month of interval from January 2010 to December 2011. For each species individual record of different phenophases were taken into consideration. Observations were made on leaf fall, flowering, fruiting at an interval of one month and recorded in a tabular form.

RESULTS

There is wide fluctuation in the phenology of a species from region to region due to changes in the climatic conditions.

Leaf fall: The average time of commencement and completion of leaf fall is given in table-1. It has been noted that this phenomenon starts from January and continues up to February. Maximum leaf fall occurred in January - February while the least was observed during September to December.

Flowering: The observations about the time of beginning and completion of flowering of different species of medicinal plants are tabulated. The maximum number of medicinal tree taxa was found to flower during the months of March and April and only a few were in bloom during the period October - December. The peak flowering period of tree taxa coincided with the hot and dry season (March - April) (Table 1).

Fruiting: The observations about the time of beginning and completion of fruiting for various species are given in table. 1. The time interval between flowering and fruiting was normally

30-45 days. Three species viz., *Hibiscus tiliaceus*, *Thespesia populinea* and *Nothopegia heyneana* were observed to flower and fruit throughout the year.

Table – 1 Phenology of Tree Species in the study area

| S.no | Botanical name | Phenology | | |
|------|--|---------------------|--|---------------------|
| | | Leaf Fall | Flowers | Fruit |
| 1 | <i>Miliusa eriocarpa</i> Dunn | - | Throughout the year | - |
| 2 | <i>Polyalthia cerasoides</i> (Roxb) | Jan | Mar-July | May onwards |
| 3 | <i>Capparis grandis</i> L.f | - | April-July | June onwards |
| 4 | <i>Crataeva religiosa</i> forster.F. | - | Feb-April | - |
| 5 | <i>Casearia tomentosa</i> Roxb | | Feb-April | |
| 6 | <i>Flacourtia sepiaria</i> Roxb | - | Jun-Sep (peak) Jan-Mar (Lesser) | Aug onwards |
| 7 | <i>Scolopia crenata</i> (wight&Arn) | - | April-July | June onwards |
| 8 | <i>Pittosporum floribundum</i> wight&Arn. | - | May-Aug | June onwards |
| 9 | <i>Hibiscus tiliaceus</i> | Throughout the year | | |
| 10 | <i>Thespesia populinea</i> | Throughout the year | | |
| 11 | <i>Bombax malabaricum</i> DC | Feb-Mar | Mar-April | April onwards |
| 12 | <i>Helicteres isora</i> L. | - | Sep- Dec | Dec- Mar |
| 13 | <i>Hildegardia populifolia</i> | March | Mar-April | |
| 14 | <i>Sterculia foetida</i> L. | Jan-Feb | Mar-April | October |
| 15 | <i>Sterculia urens</i> Roxb | December | Dec-Mar | June |
| 16 | <i>Grewia emarginata</i> vahl. | - | Apr | Throughout the |
| 17 | <i>Aegle marmelos</i> (L) corr.serr. | Jan | Mar | Feb |
| 18 | <i>Atalantia monophylla</i> | - | Sep-Dec & Feb-Mar | - |
| 19 | <i>Atalantia racemosa</i> W & A | - | Dec-Apr | Jan onwards |
| 20 | <i>Chloroxylon swietenia</i> DC. | Feb-Mar | Mar - Apr | Persistent |
| 21 | <i>Euodia lunu</i> – ankenda Gaertner). Merr | | Sep-Nov | Throughout the year |
| 22 | <i>Feronia lephantum</i> Corr. Serr | Dec | Jan-Mar | Persistent |
| 23 | <i>Limonia crenulata</i> Roxb | Feb | April- May | July- Sep |
| 24 | <i>Ailanthus excelsa</i> Roxb | - | Jan-Mar (Aug-Sep at the higher altitudes) | Mar onwards |
| 25 | <i>Balanites roxburghii</i> planchon | Feb | Mar-April | April onwards |
| 26 | <i>Commiphora berryi</i> (Arn) | Feb | Mar | April |
| 27 | <i>Commiphora caudata</i> Engl(W&A) | Feb | April | Throughout the year |
| 28 | <i>Garuga pinnata</i> Roxb | Sep | Feb-Mar | Aug |
| 29 | <i>Aglaia roxburghiana</i> W&A | - | Nov-Feb | Rusty, Persistent. |
| 30 | <i>Amoora canarana</i> (Turcz) | - | April- May | July-Sept |
| 31 | <i>Azadirachta indica</i> Adr. | - | Mar-Apr | June |
| 32 | <i>Cedrela toona</i> Roxb. | Dec | Feb-Mar | Aug |
| 33. | <i>Chukrasia tabularis</i> Adr. | | April- June | Feb |
| 34. | <i>Melia azedarach</i> L. | | Jan-Mar | Aug |
| 35. | <i>Melia composita</i> Willd. | Jan | Mar | April-July |
| 36. | <i>Swietenia macrophylla</i> King | Jan onwards | April | Dec-Jan |
| 37. | <i>Elaeodendron glaucum</i> (Rottb) | - | Mar-Apr (Plains to 500m) Jul-Sep(Hills above 500m) | throughout the year |
| 38. | <i>Pleurostyliia wightii</i> W & A | - | Jul-Nov | Aug onwards |
| 39. | <i>Ziziphus jujuba</i> (L.) | - | Jul-Nov | Oct-Dec |
| 40. | <i>Ziziphus trinervia</i> Roxb | - | Mar-May | Jul-Sep |
| 41. | <i>Ziziphus xylopyrus</i> (Retz) Willd | - | May-Jul | Jun-Dec |
| 42. | <i>Filicium decipiens</i> W & A | - | Oct-Jan | Mar-Apr |
| 43. | <i>Lepisanthes tetraphylla</i> (Vahl) | - | Mar-April | April-May |

| | | | | |
|-----|--|------------------|--|---------------------|
| 44. | <i>Sapindus emarginata</i> Vahl | - | Feb-Apr (lower altitude) and Aug-Dec (higher altitudes). | Throughout the year |
| 45. | <i>Schleichera trijuga</i> Willd | Jan | Mar-Apr | Apr- May |
| 46. | <i>Buchanania angustifolia</i> Roxb | - | May-June | June-Dec |
| 47. | <i>Nothopegia heyneana</i> Hook.f. | Through the year | | |
| 48. | <i>Odina wodier</i> Roxb | Mar-April | - | April onwards |
| 49. | <i>Spondias mangifera</i> Willd | Feb | Feb-Mar | June onwards |
| 50. | <i>Moringa concanensis</i> Nimmo ex Dalz | Jan | Feb-April | April onwards |

DISCUSSION

The phenological processes are only expressed after many change with in plant specially a chain of biochemical changes leads to physical eventsof,the physiological cost of reproduction have been s investigated in a perennial plant species, for this purpose two different classes of estimates of current reproductive investment were compared, with the goal of identifying th most powerful predictor of future reproductive effort. “ Static” estimates, those typically used to measurecurrent reproductive investement (i.e., biomass or nutrients allocated to reproduction),neglect the physiological processes that influence actual reproductive expenditure. Conversely, “dynamic “ estimates that oncorporate reproductive photosynthesis or respiration , nectar production,or reproductive nutrient resorption offer a more accurate assessment of current reproductive investement. The result of the present investigation suggests that there is a strong seasonal variation in phenology of tree species in their natural habitats. A correlation of phonological activity with seasonal events is best exemplified by patterns in leaf fall and leaf flushing.

The pattern of leaf fall recorded in the fifty tree taxa is given in Table 1. Maximum leaf fall occurred in January - February while the least was observed during September to December. Similar pehnophase sequences were recorded in other Indian floras [3] [4] as well as in individual taxa investigated in other floristic regions of the world [5] [6]. In most evergreens, old leaves abscised over a period of time throughout the year as and when they aged, thus retaining a steady population of functional leaves all the time; but even in these cases there was often a period when leaf fall was substantial.

Flowering showed negative correlation with rainfall, such a seasonal activity could be attracting pollinators. Reproductive events generally occur during the period of low photosynthetic activity or after the period of high rates of reserve accumulation [7]. A comparison of the data obtained in this study with those in the literature reveals that flowering phenology of the previous studies shows to be more or less uniform irrespective of the locality, altitude, and type of vegetation as indicated in other studies [8] [9] [10] [11] [12] [13]. The reason behind those environmental factors such as rainfall and photoperiod appeared to control the flowering period of part of the species [14].

Fruiting of tree species occurs in cool and dry winter. The phenological timing of tree species seems to set during the transition of winter and spring seasons so that summer rainfall facilitates recruitment of plants through germination. The variations of different phenophases are due to fluctuation of

environmental condition, habitat and availability of the soli nutrients and adapt to the habitats accordingly with the adaphic factors observed in the preset study. Phenological studies have been made by several authors like Srivastava [15], Islam [16] and others.

CONCLUSION

Knowledge on phenology and floristic survey systems for any natural ecosystem constituting medicinal plants taxa is very helpful in deciding strategies for responsible management of plant genetic resources including conservation activities.

REFERENCES

1. A.A. Ansari, Phenological aspect of Madhulia forest, Gorakhpur. The Ind Fores, 115(4) 1989 250-257.
2. D. Barman , N. Nath, Kishor Deka, Phenology of some medicinal plant species of Goalpara District, Assam (India). Sch Acad J Biosci 2(2) 2014 81-84.
3. R. Booj, P.S. Ramakrishnan, Phenology of trees in a subtropical evergreen montane forest in Northeast India. Geo-Eco-Tro 5 1981 189-209.
4. S. Boinski, N.L. Fowler, N.L., Seasonal patterns in a tropical lowland forest. Biotropica 21(3) 1989 223-233.
5. R. Borchert, Phenology and control of flowering in tropical trees. Biotropica 15(2) 1983 81-89.
6. G.W. Frankie, H.G. Baker, P.A. Opler, Comparative inflammatory studies of trees in tropical west and dry forests in lowlands of Costa Rica. J Ecol 62 1974 881-919.
7. M. Fenner, The phenology of growth and reproduction in plants. Perspective in Plant Ecology. Evol Sys 1: 1998 8 – 91.
8. S.L. Hilty, Flowering and fruiting periodicity in a premontane rain forest in Pacific Columbia. Biotropica 19(4) 1980 292-306.
9. M. Islam, Weeds of North East India, First ed. Dhaili, Sibsagar, 1996.
10. Jha, Ramesh Kumar, Pandey, Ravindra Kumar And Sharma, Gopal Ram, Forest Land Use planning for Dharhara range, Monghyr (Munger) forest division (Bihar). Ind Fores 2 2006 181-186, (127).
11. P.K. Jain, P.K.Modi, S.J.P.Khanam, M.K. Rai, Phenological research with reference to medicinal plant such as *A. paniculata*, *A. racemosus*, and *H. isora* in Damoh district (M.P.). Glob J Multidi Stu 3(11) 2014 243 – 248
12. L. Medway, Phenology of a tropical rain forest in Malaya. Bio J Linn Soc 4 1972 117-146.

13. I.A. Navchoo, P. Kachroo, Phenology of vegetation of Pulwama (Kashmir, India). *The Ind Fores* 112(9) 1986 833-839.
14. P.I. Oni, S.O. Jimoh, L.A. Adebisi, L.A. Population pattern and phenological behaviours for selected medicinal plants in Nigeria; implications for ex-situ conservation. *J Appl Pharm Sci* 3(07) 2013 052 – 060.
15. P.I. Oni, Ethno-botanical survey of a fallow plot for medicinal plants diversity in Idena, Ijebu Ode. South Western Nigeria. *J Med Pl Res* 3 2010 (10) 45-52.
16. R.K. Srivastava, A note on phonological observations of *Aegle marmelos* Correa. *The Ind Fores* 108 (8) 1982 593 – 595.

Citation: V.Nandagopalan *et al* (2015). Phenological Behaviour of Some Tree Species of Pachamalai, Tamilnadu, India. *J. of Advanced Botany and Zoology*, V3I4. DOI: 10.15297/JABZ.V3I4.04.

Copyright: © 2015 V.Nandagopalan. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.