

Seasonal rhythms and Phenological behaviour of leaves in some Tropical deciduous forest tree species

Mukta Shrivastava

Department of Botany,
Govt. M.L.B Girl's P.G. (Auto) College, Bhopal-462008 (India)
mukta.shrivastava07@gmail.com

Abstract

The seasonal changes of plants in relation to various phases of their life cycle are termed as phenological events. Thus, the leafing, flowering, fruiting, leafing fall and fruit fall etc., of plant in relation to the climatic conditions are some aspects of these studies. Phenological changes occurring in the surrounding flora have often attracted man's attention and very frequently agricultural practices have been correlated with these phenomena. Detailed and objective studies of phenology, particularly in the case of forest trees have been initiated. The phenology of the forest tree species came to be appreciated with the gradual development of the science of forestry and botany. The phenological studies are also useful in determining the character of forest floor composed of different species. Present study deals with the leafing and leaf fall behaviour of some forest tree species in relation to the time period and seasonal changes.

Key words: Leafing and leaf fall, tree species, Seasonal Changes, Phenology.

The seasonal changes of plants in relation to various phases of their lifecycle are termed as phenological events. Thus the leafing, flowering, fruiting, leaf fall and fruitfall etc., of plants in relation to the time period are some aspects of these studies Shellford¹⁸ first used the term to correlate the appearance of certain seasonal events. Daubenmire³ defined phenology to include all studies on the relationships between climate factors and the periodic phenomenon in plants. The studies

on the phenology of tropical rain forests have been made by Scheffler¹⁷ in Africa, Schimper¹⁹ in Java, Wright²² in Ceylone. The phenological investigations in temperate forests were done by Holttum⁸, Leven¹¹ Grill⁵ and Ahlgren¹. The Phenological behaviour of forest trees in India has been studied by many workers. Gupta⁶ has made certain phenological studies on the flora of Nainital and Mussouri hills, Bhatnagar² studied the phenology of forest trees in dry deciduous forests of Sagar. Seasonal changes

affecting phenological events are also emphasised by some workers. Vol kens²⁰ observed a relationship between leaf fall and leafing periods in tropical rain forest of Java, Njoku¹⁵ pointed out a relationship between flowering and leafing behaviours of tropical rain forests of Nigeria, Bhatnagar² has studied the relationship between leafing and flowering events in some tree species of Sagar forests.

Procedure of phenological observation was followed after Bhatnagar². For the study of leafing and leaf fall behaviour of forests site was monthly visited and leafing and leaf fall were noted for individual tree species was tabulated and the species of similar characteristics were classified together in to suitable correlated group of identical behaviour.

Leafing :

The field observations about the average period of beginning and completion of the leafing for the various species are given in table-1. A perusal of this reveals two major periods of the leafing *i.e.* rain leafing and summer leafing.

Period I rain leafing :

Some species were observed to bear new foliage just on the onset of the first rains *i.e.* at the end of June or in early July. Leafing (*i.e.* unfolding of leaf buds and expansion of lamina) under this period continues up to August.

In *T. tomentosa* and *T. grandis* this phenomenon starts from June and it may continue up to August.

Period II Summer Leafing :

A large number of species were observed to bear new foliage in summer months. The period covered the months from March to June. Many species put on new foliage during early summer months, while few species show leafing during late summer. Some species viz. *A. catechu*, *A. pendula*, *C. fistula*, *D. melanoxylon*, *L. parviflora* and *O. dalbergioidis* were observed to bear new foliage in summer months, *i.e.* March to June.

From these observations it is revealed that nearly 92% of tree species of the forests under study put on new foliage during summer season.

Other investigations carried out elsewhere also support the results of present investigations. The study of leafing in tropical rain forest of southern Nigeria¹⁵ in semi deciduous forests of north western Costa Rica⁴ and at New forest of Dehradun⁹ showed that summer leafing is a prominent phenomena

Leaf fall :

The average period of commencement and completion of the phenomenon is given in table 5 on the basis of monthly field observations of forest, broadly two leaf fall periods were recognized *Le.* winter leaf fall and summer leaf fall.

Period I winter leaf fall :

It has been observed that during this period leaf fall starts from October in a few

Table-1. Leafing behaviour of Some tree Species

Species	Month of beginning	Month of completion	Duration of event in months
<i>Acacia catechu</i> Willd.	May	June	2
<i>Anogeissus pendula</i> Roxb.	May	June	2
<i>Cassia fistula</i> L.	May	June	2
<i>Diospyros melanoxylon</i> Roxb.	May	June	2
<i>Lagerstroemia parviflora</i> Roxb.	April	June	3
<i>Ougeinia dalbergioides</i> Edgew	March	May	3
<i>Terminalia tomentosa</i> Cooke	June	August	3
<i>Tectona grandis</i> L.	June	August	3

Table-2. Leaf fall behaviour of Some tree Species

Species	Month of Beginning	Month of Completion	Duration of event in months
<i>A. catechu</i>	December	March	4
<i>A. pendula</i>	January	March	3
<i>C. fistula</i>	December	March	4
<i>D. melanoxylon</i>	March	May	3
<i>L. parviflora</i>	December	March	4
<i>O. dalbergioides</i>	January	February	2
<i>T. tomentosa</i>	December	April	5
<i>T. grandis</i>	December	March	4

species and it may continue up to March in others. In other words a few species started shedding the old leaves during the early winter while others commenced leaf fall during the late winter. Species which defoliate during this period were *A. catechu*, *A. pendula*, *C. fistula*, *L. parviflora*, *O. dalbergioides*, *T. tomentosa* and *T. grandis* (Table-2).

Period II Summer leaf fall :

The period covered the months from February to May. Many species began shedding their old leaves during early summer while others started during late summer. Species (viz., *D. melanoxylon*) shed their old leaves during summer season.

The observations on leaf fall have also been made by many workers in different forest stands of the world. In the tropical rain forests, leaf fall is continuous through the year but with a tendency for greater fall during the dry months of the year. In Ghana a short dry season in January and February was noted as leading increased leaf fall¹⁶, Laudelout and Meyer¹⁰ also suggested that some leaf fall continued through the year but major portion occurred during the dry season. At Ibadan, Nigeria, timing of leaf fall during the dry season was over 10 times greater than the remainder of the year¹².

In warm temperate forests, the leaf fall is nearly a continuous phenomenon round the year. Some times it is maximum from January to March⁷ while in other cases it may be rather more in warm winter months (*i.e.* in October to November) Miller and Hurst¹⁴ maximum summer leaf fall was also obtained by Will²¹ in coniferous forests of New Zealand.

From these observations it is revealed that nearly 92% of tree species of the forest under study put on new foliage during summer season other investigations carried out elsewhere also support the results of present investigations.

The observation of leaf fall behaviour also shows that nearly 87% of tree species of the stand shredded their old leaves during winter season.

In dry deciduous forests of Sagar, seasonal leaf fall has been observed earlier by Bhatnagar². He has made observations on

leaf fall of a number of forest trees of the area and found that winter and early summer leaf fall is a prominent phenological feature of forests of Sagar. This supports observations obtained in the present study.

References :

1. Ahlgren, C.E. (1957). *Ecol.*, 38: 622-628.
2. Bhatnagar, S. (1968). Ecological studies of forest of Sagar with special reference to litter and ground flora. Ph.D. Thesis, Sagar University, Sagar.
3. Daubenmire, R. (1947) Plants and environment, Wiley Eastern Pvt. Ltd., New York.
4. Daubenmire, R. (1972). *J. Ecol.*; 68: 167-170.
5. Grill, J. M. (1955). Preliminary regional phenological comparison. Project N>F. 17, Binder 1137, Canadian Department of Northern Affairs and Natural resources. eg. 44.
6. Gupta, R.K. (1960). *Ibid.*, 87: 189-193.
7. Hatch, A.B. (1955). *Fotr. Burr. Canberra*, 70: 18.
8. Holtum, R. E. (1931). *Bull. Strisita settlements*, 5: 173-206.
9. Krishnaswamy, V. S. and G.S. Mathauda (1954). Phenological behaviour of a few forest species at New Forest, Dehradun. *Indian for.*; 80: 124-153.
10. Laudelout, H. and J. Meyer (1954) *Trans 5th Int. congrs. Soil Sci.*, 2: 267-272.
11. Leven, T.K. (1951) *Scottish Forestry*, 5: 33P.
12. Madge, D.S. (1965). *Pedobiologia*, 5: 273-

- 288.
13. Mayer, A.M. and A. Pojarkoft-maber (1963). *The germination of seeds* pergamon press, London.
 14. Miller, R.B. and F. B. Hurst (1957). *For. Res. Noters*, 8: 14 P.
 15. Njoku, E. (1963) *J. E col*; 48: 549-553.
 16. Nye, P.H. (1961). *Plant and soil*, 13: 333-346.
 17. Scheffler, G. (1901) *Notizbl. bot. cart. Berl*, 3: 139-166.
 18. Schelford, V.E. (1929) *Laboratory and field ecology*. Baltimore, Williams and wilkins.
 19. Schimper, A.F. W. (1903) *Plant geography upon a physiological basis*. Edited by P. Groom and I.B. Balfour, Oxford.
 20. Volkens, G. (1972) *Laubfall and Lauberneuerung indien Tropen*, Berlin.
 21. Will, G.M. (1959) *Agric Res*; 2: 718-734.
 22. Wright, H. (1905). *Ann. Bot. Gdns perandeniya*, 2: 415-517.