

Phenological studies of herbaceous medicinal plants of Surguja district (Chhattisgarh)

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






































































































































































Abstract

Phenological studies are important for the cultivation of medicinal plants, as it provides the idea about the best suitable climatic conditions for their vegetative growth and reproduction time. More than 106 species of medicinal plants belonging to 37 families, were recorded for phenological studies in session 2022-23. Nearly all the herbaceous medicinal plants make their appearance in the month of July and August. During these two months most of the species were in vegetative condition. Phenology of herbaceous vegetation revealed that majority of annual plants flowers between the month of September to January. Few species like *Datura alba*, *Calotropis procera*, *Cleome viscosa*, *Phyla nodulosum*, *Eclipta alba*, *Cyperus rotundus*, *Cassia tora*, *Cassia occidentalis*, and *Cassia alata* were in flowering stage in the month of August. *Argemone mexicana* flowered in late winter. *Rauwolfia tetraphylla*, *Tinospora cordifolia*, and *Vitex negundo* flowered in summer. *Catharanthus roseus*, *Chenopodium album*, *Oxalis corniculata*, *Amaranthus viridis* *Cynodon dactylon*, *Tridax procumbens*, *Calotropis procera*, *Hyptis suaveolens* and *Euphorbia hirta* flowered in all seasons. *Acorus calamus* and *Cissus quadrangularis* are always in vegetative growth.

Key words : Phenological, Ethnomedicinal plants, Herbaceous, Surguja.

Chhattisgarh is one of the richest biodiversity habitate of India. Surguja district is spread over with high lands/uplands and dense forest in its north and south region and it lies between 22°94' to 24°6' N latitude and 81°35' to 84°5' E longitude. The major type of soil is red and yellow. In Surguja rainfall varies between 1000-2000 mm, with mean annual

¹Research Scholar, Asstt. Prof. of Botany, ²Retd...Asstt. Prof of Botany, ³Asstt. Prof.

92	<i>Rauvolfia tetraphylla</i> L.													
93	<i>Ricinus communis</i> L.	—												
94	<i>Rungia pectinata</i> (L.) Nees	—												
95	<i>Scoparia dulcis</i> L.	—												
96	<i>Sida cordifolia</i> L.	—	—											
97	<i>Solanum nigrum</i> L.	—	—											
98	<i>Solanum xanthocarpum</i> Schrad.	—	—	—										
99	<i>Sphaeranthus indicus</i> L.	—	—											
100	<i>Spilanthes paniculata</i> Wall ex DC.	—												
101	<i>Tephrosia purpurea</i> L. Pers.	—	—	—										
102	<i>Tinospora cordifolia</i>	—	—											
103	<i>Tridax procumbens</i> L.	—	—											
104	<i>Urena lobata</i> L.	—	—											
105	<i>Vernonia cinerea</i> L. Less	—	—											
106	<i>Vitex negundo</i> L.	—	—											

temperature 26°C to 27°C and relative humidity is 60-80%. Phenology is the art of observing life cycle phases or activities of plant in their temporal occurrence throughout the year³. The importance of phenological events is much more meaningful in describing and explaining seasonal aspect of ecological phenomena^{1,4}. In order to plan an effective management of medicinal plants, information on different life phases, like time of germination, vegetative growth, flowering, fruiting, seed production and the time of death of the plant is crucial. Such phenological observations which had been recorded in the field can provide valuable information about the ecological life of a plant. Phenological studies are important for the cultivation of medicinal plants, as it provides the idea about the best suitable climatic conditions for their vegetative growth and reproduction.

Phenological events were recorded for the entire year from the April 2022 to March 2023 by visiting the study sites at regular intervals during the growth period of plants. Phenology of the individual species in study sites has been studied and records were kept regarding the time for different phenological stages of the life cycle like vegetative growth, flowering, and fruiting. Plants were identified with the help of standard flora and their herbarium prepared. Observation of the phenological events of individual species has been recorded in the form of phenograms. The phenograms are shown on page nos. 1110-1116:-

One hundred and six species belonging to 37 families, were recorded for phenological events. Nearly all the herbaceous medicinal

plants make their appearance in the month of July and August. During these two months most of the species were in vegetative condition. Phenology of herbaceous vegetation revealed that majority of annual plants flower between the month of September to January. Few species like *Datura alba*, *Calotropis procera*, *Cleome viscosa*, *Phyllanthus nodulosum*, *Eclipta alba*, *Cyperus rotundus*, *Cassia tora*, *Cassia occidentalis*, and *Cassia alata* were in flowering stage in the month of August, some of them were in fruiting stage also in the same month. *Achyranthus aspera*, *Ageratum conyzoides*, *Vernonia cinerea*, *Cassia tora*, *Chenopodium album*, *Euphorbia thymifolia*, *Amaranthus spinosus*, *Datura alba*, *Heliotropium indicum*, *Ricinus communis*, *Boerhavia diffusa*, *Sida cordifolia*, *Abutilon indicum*, *Leucas aspera*, *Leonotis nepetifolia*, *Merremia emarginata*, *Mimosa pudica*, *Malvastrum coromandelianum*, *Solanum nigrum*, *Solanum xanthocarpum*, *Asparagus racemosus*, *Barleria prionitis*, *Bryophyllum pinnatum* and *Tridax procumbens* flowered in winter season. *Argemone mexicana* flowered in late winter. *Rauwolfia tetraphylla*, *Tinospora cordifolia*, and *Vitex negundo* flowered in summer. *Catharanthus roseus*, *Chenopodium album*, *Oxalis corniculata*, *Amaranthus viridis*, *Cynodon dactylon*, *Tridax procumbens*, *Calotropis procera*, *Hyptis suaveolens* and *Euphorbia hirta* flower in all seasons. *Acorus calamus* and *Cissus quadrangularis* are always in vegetative growth. Many researchers such as Agrawal¹, Negi *et al.*,⁴ etc. obtained similar results in some plant species. In phenological behaviour of the herbaceous medicinal plants it has been found that, different phenophases were closely related with the climatic condition

of the year. Most of the species show their vegetative growth during the rainy season and reproductive growth in the winter season. Very few plants were flowering in the summer season.

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