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PHENOLOGICAL STUDY OF SELECTED TREE SPECIES LOCATED IN TWO DIFFERENT AREAS OF AHMEDABAD CITY , GUJARAT, INDIA.

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Abstract:

Phenology is a term that refers to the dates of the first occurrence of each natural event in its annual cycle. It entails examining how living organisms react to seasonal and climate changes in their surroundings. A total of 11 species from seven families were chosen at random for the study, including two Sapotaceae species, two Fabaceae species, two Moraceae species, two Meliaceae species, one Rutaceae species, one Moringaceae species, and one Bignoniaceae species. The current study evaluated the phenology of selected tree species from New Maninagar and jashoda nagar, Ahmedabad, over a three-month period (January 2021 to March 2021). Selected tree species and their branches were tagged for observations of various phenological events at these study sites, and visited these sites at least three times in a month for observations. Observations were made during the interval between two sampling dates (usually 10 days) and presented as phenogram. In all conspecific trees, the following phenological events were observed viz. 1) Leafing 2) Flowering 3) Fruiting and 4) Leaf fall. This research found that maximum leaf initiation occurred in the months of February and March (06 species), maximum flowering occurred in the months of January and March (03 species), maximum fruiting occurred in the months of January and March (07 species), and maximum leaf fall occurred in the months of January and March (02 species). The variations in phenophases are due to changes in environmental conditions, habitat, and soil availability, as well as the nutrient content of the soil, which was adapted to the habitats in accordance with the surrounding abiotic and biotic environment of this study area.

Key Words: Phenology, Leafing, Flowering, Fruiting and Leaf fall.

1. Introduction:

Phenology is derived from the Greek words "phaino" and "logos," which mean "to show" and "to study," respectively. Charles Morrenin, a Belgian botanist, was the first to coin the term phenology in 1853. Because it is permitted by the natural rhythm, phenology is known as nature's calendar. It is the study of how biological events in plants, such as vegetative growth, flowering, fruit formation, fruit maturation, and leaf fall, occur at specific times (Leith,1974). Phenology is a term that refers to the dates of the first occurrence of each natural event in its annual cycle (Kasarkar, A. R., & Kulkarni, D. K.,2011). It entails examining how living organisms react to seasonal and climate changes in their surroundings (Moza, M. K., & Bhatnagar, A. K.,2005). Temperature is one of the most important factors which affect the flowering and fruiting phenology of any species. However, many factors influence flowering and fruiting, including humidity, rainfall, and day length (Nakar, R. N., & Jadeja, B. A.,2015). A total of 11 species from seven families were chosen at random for the study, including two Sapotaceae species, two Fabaceae species, two Moraceae species, two Meliaceae species, one Rutaceae species, one Moringaceae species, and one Bignoniaceae species. The current study evaluated the phenology of selected tree species from New Maninagar, Ahmedabad, over a three-month period (January 2021 to March 2021).

2. Material and Methods:

2.1. Study area:

The study of phenological events of selected tree species were carried out in two areas of Ahmedabad during 2021.

(1) New maninagar, Ahmedabad.

(2) Jashoda nagar, Ahmedabad.

Selected tree species and their branches were tagged for observations of various phenological events at these study sites, and visited these sites at least three times in a month for observations. Observations were made during the interval between two sampling dates (usually 10 days) and presented as phenogram. In all conspecific trees, the following phenological events were observed viz. 1) Leafing 2) Flowering 3) Fruiting and 4) Leaf fall. Each phenophases was marked with a separate symbol.

3. Results:

The result and observations of the experiments are presented in following Tables and figures.

Table 1: Phenogram of selected species from New maninagar, Ahmedabad.

Family	Plant name	New maninagar							
		January			February			March	
Sapotaceae	*Manilkara zapota* (L.)P.Royen	♣ ☼	♣ ☼	♣ ☼	♣☼	♠♣ ☼	♠♣ ☼	♠♣ ☼	♠♣ ☼
Fabaceae	*Senna siamea* (Lam.)	♣ ☼	♣ ☼	♣ ☼	☼	☼	♠☼	♠☼	♠☼
Moraceae	*Ficus benghalensis* L.	♠ ☼	♠ ☼	♠ ☼	♠☼	♠☼	♠	♠	♠
Meliaceae	*Azadirachta indica* L.	▼	▼	▼	▼	♠	♠♣	♠♣	♠♣
Meliaceae	*Melia azedarach* L.	♠ ☼	♠ ☼	♠ ☼	♠♣ ☼	♠♣ ☼	♠♣ ☼	♠♣ ☼	♠☼
Moringaceae	*Moringa oleifera* L.	♣ ☼	♣ ☼	♣ ☼	♣☼	♣☼ ▼	☼ ▼	♠☼ ▼	♠☼ ▼

Table 2: Phenogram of selected species from Jashoda nagar, Ahmedabad.

Family	Plant name	Jashoda nagar							
		January			February			March	
Sapotaceae	*Mimusops elengi* L.	♣ ☼	♣ ☼	♣ ☼	♣ ☼	♣ ☼	♣ ☼	♣ ☼	♣ ☼
Moraceae	*Ficus religiosa* L.	☼	☼	☼	▼ ☼	▼	▼	▼	▼
Rutaceae	*Aegle marmelos* (L.) correa	☼ ▼	☼ ▼	☼ ▼	☼ ▼	☼ ▼	☼ ▼	☼ ▼	☼ ▼
Bignoniaceae	*Milingtonia hortensis* L.	♣	♣	♣	▼	▼	♠ ▼	♠	♠
Fabaceae	*Bauhinia Purpurea* L.	♣ ▼	♣ ▼	♣ ▼	♣ ▼	♣ ▼	♣ ▼	♣ ▼	♣ ▼

Where ♠ = Leafing ♣ = Flowering ☼= Fruiting ▼= Leaf fall

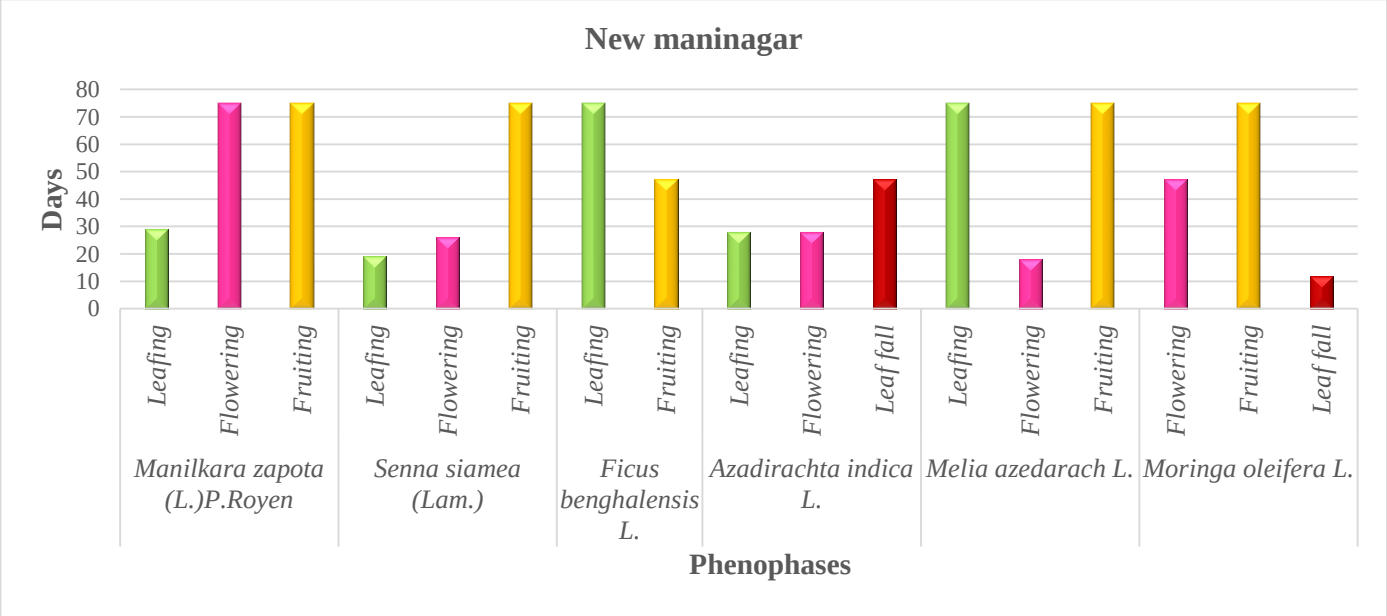


Figure 1: Phenophase (in days) of selected species from New maninagar, Ahmedabad.

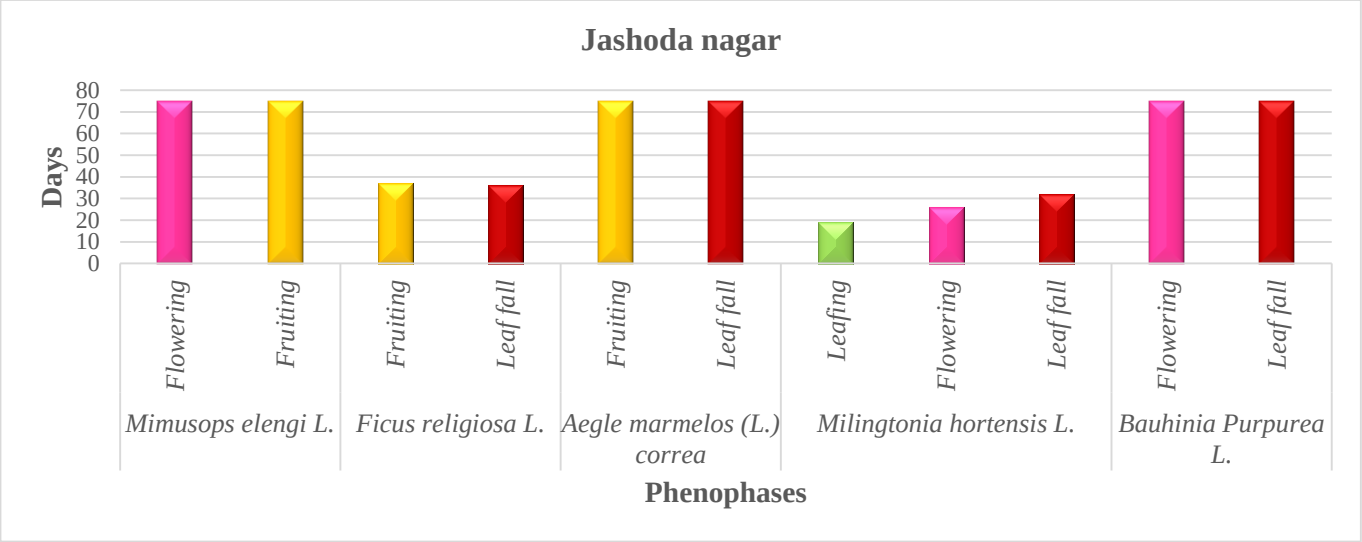


Figure 2: Phenophases (in days) of selected species from jashoda nagar, Ahmedabad.

From the present study, it was recorded that leafing phenophase was occurred during the month of february to march in *Manilkara zapota* (L.) P. Royen (29 days), *Senna siamea* (Lam.) H.S. Irwin & Barneby (19 days) , *Milingtonia hortensis* L (19 days). and *Azadirachta indica* L. (28 days) while it was observed in *Ficus benghalensis* L. (75 days) and *Melia azedarach* L. (75 days) during january to march. Flowering phenophase was observed during january to march in *Mimusops elengi* L. (75 days), *Manilkara zapota* (L.) P. Royen (75 days) and Bauhinia purpurea L. (75 days) whereas in *Senna siamea* (Lam.) H.S. Irwin & Barneby (26 days) and *Milingtonia hortensis* L. (26 days) it was observed during the month of january, and in *Moringa oleifera* L. (47 days), it was observed in the month of january to february. Fruiting was observed during January to march in *Manilkara zapota* (L.) P. Royen(75 days), *Mimusops elengi* L. (75 days), *Senna siamea* (Lam.) H.S. Irwin & Barneby(75 days), *Ficus religiosa* L. (37 days), *Melia azedarach* L. (75 days), *Aegle marmelos* (L.) correa(75 days) and *Moringa oleifera* L. (75 days) While in *Ficus benghalensis* L. (47 days), it was observed during january to february. Leaf fall was occurred during the month of january to march in Bauhinia purpurea L. (75 days) and *Aegle marmelos* (L.) correa (75 days) while in *Azadirachta indica* L. (47 days) and *Milingtonia hortensis* L. (32 days) it was found in january to February and in *Ficus religiosa* L. (36 days) and *Moringa oleifera* L. (12 days) it was recorded from february to march. Phenological phases of 11 tree species are following:

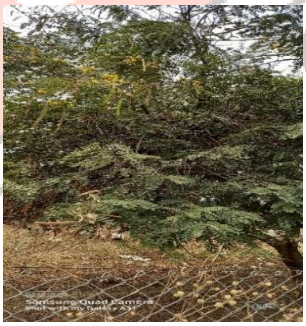
1. *Manilkara zapota* (L.) P.Royen


Leafing


Flowering & fruiting

2. *Senna siamea* (Lam.) H.S.Irwin & Barneby


Leafing


Flowering & fruiting

3. *Ficus benghalensis* L.


Leafing


Fruiting

4. *Azadirachta indica* L.


Leafing

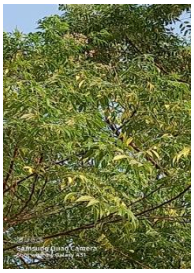

Flowering


Leaf Fall

5. *Melia azedarach* L.

6. *Moringa oleifera* L.


Leafing


Flowering


Fruiting


Leafing


Flowering & fruiting


Leaf Fall

7. *Bauhinia purpurea* L.


Flowering

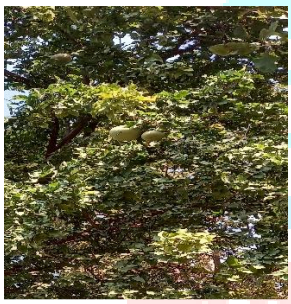

Leaf fall

8. *Ficus religiosa* L.


Fruiting


Leaf fall

9. *Aegle marmelos* (L.) correa


Fruiting


Leaf Fall

10. *Milingtonia hortensis* L.


Leafing


Flowering


Leaf fall

11. *Mimusops elengi* L.


Flowering & fruiting

4. Conclusion:

The results of this study show that the phenophases, namely vegetative and reproductive phases, studied in New Maninagar and Jashoda nagar, an area of Ahmedabad city, show variability in phenological characters due to changes in temperature, humidity, and seasonality. This research found that maximum leaf initiation occurred in the months of February and March (06 species), maximum flowering occurred in the months of January and March (03 species), maximum fruiting occurred in the months of January and March (07 species), and maximum leaf fall occurred in the months of January and March (02 species). The variations in phenophases are due to changes in environmental conditions, habitat, and soil availability, as well as the nutrient content of the soil, which was adapted to the habitats in accordance with the surrounding abiotic and biotic environment of this study area (Kumbhani N.R. and Maitreya B.B. 2020).

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