

# Topic: Photoperiodism

## B.Sc. Botany (Sub.) II

### Group: C

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## Photoperiodism

The plants in order to flower require a certain day length i.e., the relative length of day and night which is called as photoperiod. The response of plants to the photoperiod expressed in the form of flowering is called as photoperiodism.

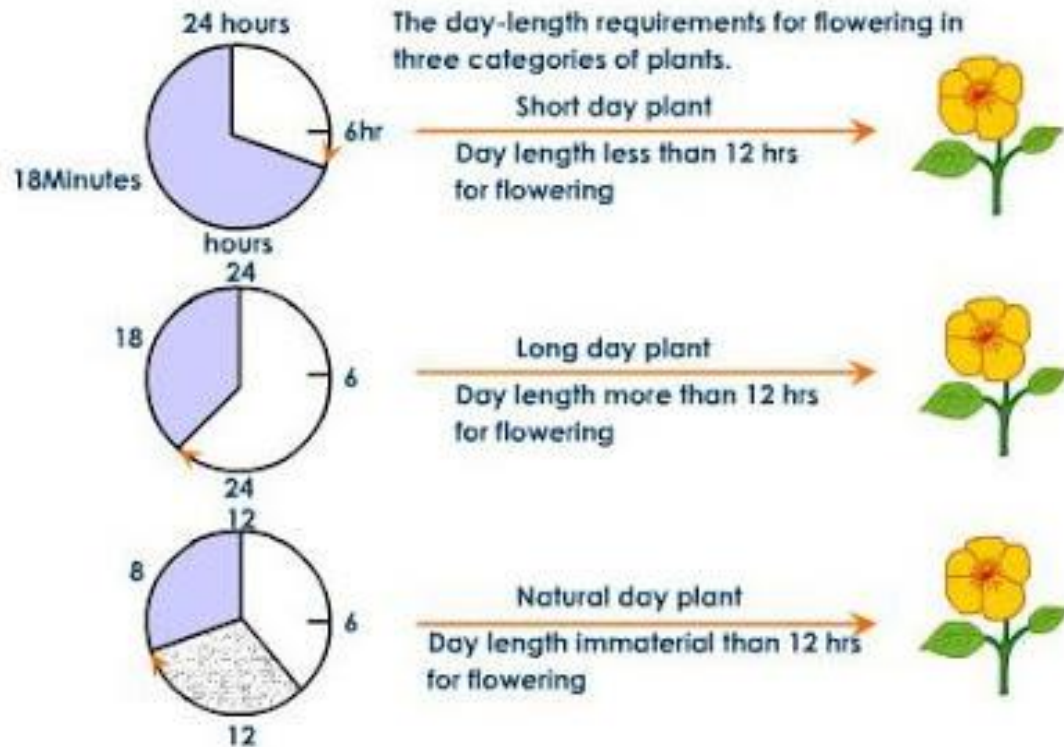
The phenomenon of photoperiodism was first discovered by Garner and Allard (1920, 22) who observed that the Biloxi variety of Soybeans (*Glycine max*) and 'Maryland Mammoth' variety of tobacco (*Nicotiana tabacum*) could be made to flower only when the daily exposure to the light was reduced below a certain critical duration and after many complex experiments concluded that 'the relative length of the day is a factor of the first importance in the growth and development of plants'.

Depending upon the duration of the photoperiod, they classified plants into three categories.

### (1) Short Day Plants (SDP)

These plants require a relatively short day light period (usually 8-10 hours) and a

# CLASSIFICATION OF PLANTS BASED ON PHOTOPERIODISM

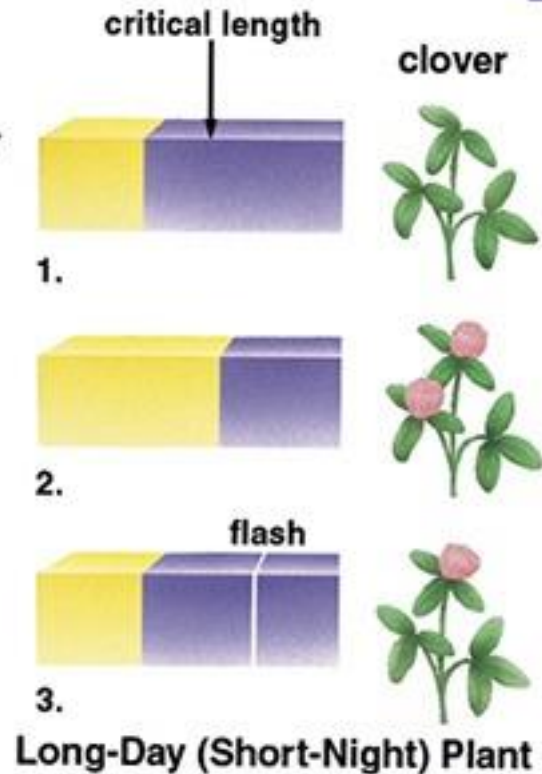
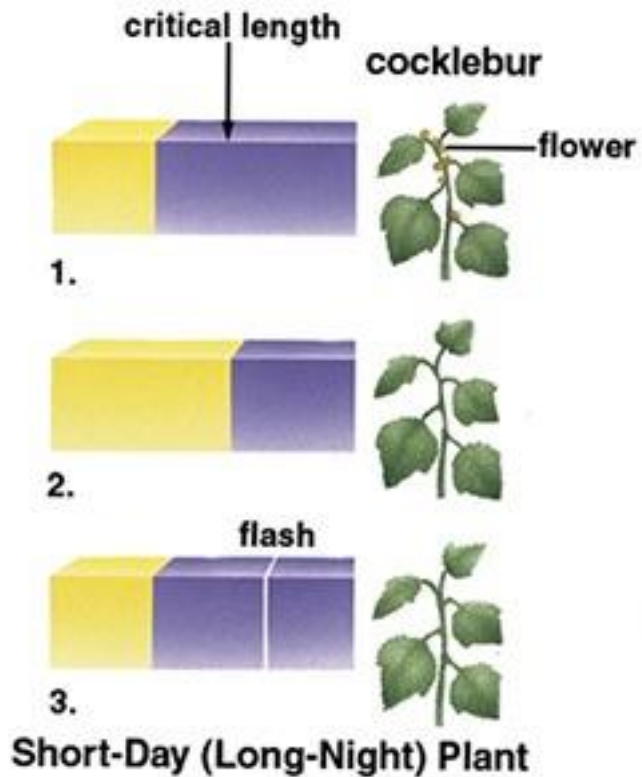


continuous dark period of about 14-16 hours for subsequent flowering. Some examples of these plants which are also known as long-night-plants are Maryland Mammoth variety of tobacco (*Nicotiana tabacum*) Biloxi variety of Soybeans (*Glycine max*), Cocklebur (*Xanthium pennsylvanicum*).

- In short day plants the dark period is critical and must be continuous. If this dark period is interrupted even with a brief exposure of red light (660-665 m $\mu$  wavelength), the short day plant will not flower.
- Maximum inhibition of flowering with red light occurs at about the middle of critical dark period.
- However, the inhibitory effect of red light can be overcome by a subsequent exposure with far-red light (730-735 m $\mu$  wavelengths).
- Interruption of the light period by dark does not have inhibitory effect on flowering in short day plants.
- Prolongation of the continuous dark period initiates early flowering in short day plants.

# Photoperiodism

day  
night



## 2) Long Day Plants (LDP)

These plants require a longer day light period (usually 14-16 hours) in a 24 hours cycle for subsequent flowering. Some examples of these plants which are also called as short night plants are *Hyoscyamus niger* (Henbane) *Spinacea* (spinach) *Beta vulgaris* (Sugar beet).

- i. In long day plants the light period is critical.
- ii. A brief exposure in the dark period or the prolongation of the light period stimulates flowering in long day plants.

## (3) Day Neutral Plants

These plants flower in all photoperiods ranging from 5 hours to 24 hours continuous exposure. Some of the examples of these plants are tomato, cotton, sunflower, cucumber and certain varieties of peas and tobacco.

During recent years certain intermediate categories of plants have also been recognised. They are Long Short Day Plants and Short-Long Day Plants.

## Long Short Day Plants

These are short day plants but must be exposed to long days during early periods of growth for subsequent flowering. Some of the examples of these plants are certain species of *Bryophyllum*.

## Short-Long Day Plants

These are long day plants but must be exposed to short days during early periods of growth for subsequent flowering. Some of the examples of these plants are certain varieties of wheat (*Triticum*) and rye (*Secale*).

## Importance of Photoperiodism

- The knowledge of the phenomenon of photoperiodism has been of great practical importance in hybridisation experiments.
- Although the floral hormone 'florigen' has not yet been isolated, the isolation and characterization of this hormone will be of utmost economic importance.

- The phenomenon of photoperiodism is an excellent example of physiological preconditioning (or after-effect) where an external factor (i.e., the photoperiodic stimulus) induces some physiological changes in the plant the effect of which is not immediately visible. It lingers on in the plant and prepares the latter for a certain process (i.e., flowering) which takes place at a considerably later stage during the life history of the plant.