S.Y.B.SC Botany

Sem IV

Paper II , Unit II

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Role of Phytochrome in Flowering of SDPs and LDPs:

Phytochrome is a blue proteinaceous plant pigment. It is present in the plasma membrane of the cells of leaves and shoot apex. It was discovered by Butler in 1959.

Role of Phytochrome in Flowering of SDPs:

- Plants which requires less than 10 hours day length for the initiation of flowering are called Short Day Plants.
- Such plants usually require 8-10 hrs light period for flowering. E.g; Rice, coffee, tobacco, soyabean.
- They need more than 12hrs dark period for normal flowering.
- They need a continuous dark period of 14-16 hours for flowering. These plants never produce flowers when the day length exceeds certain critical value or dark period is interrupted by flashes of light.
- In SDP darkness is important for flowering.
- In many SDPs, if dark period is interrupted with a brief exposure (about 1 hr) to red light, the **Pr** is converted into **Pfr** form. Because of the accumulation of **Pfr**, flowering is inhibited. If far red light is given for a brief period after red light treatment, the **Pfr** is converted into **Pr** and the plant produces flowers.
- SDPs require higher **Pr:Pfr** ratio for flowering.
- During winter months more of far red light is received on the surface of earth as compared to portions of red light reaching earth ground. This converts much of **Pfr** form into **Pr** form, inducing flowering in SDPs.
- In summer months however the reverse ratio is observed due to more portion reaching earth keep SDPs non-flowering.

Role of Phytochrome in Flowering of LDPs:

- Plants which require more than 14 hours day length for the initiation of flowering are called Long Day Plants. They usually need 14-16 hrs light period for flowering. E.g Pea, sugar beet, radish, cabbage, wheat.
- The LDPs requires night 8-10 hours dark period for flowering.
- If the LDPs get a photoperiod of less than 14hrs light and more than 8 hrs dark period, they fail to flower. In LDPs, light is important for flowering.
- The long dark period inhibits flowering in LDPs. When the LDPs is interrupted by a brief flash of light, flowering is initiated in the LDPs.
- In LDPs, the role of phytochrome is more complex so that a blue-light photoreceptor is also required for the control of flowering.
- LDPs require higher **Pr:Pfr** ratio for flowering.

- During summer months more of red light is received on the surface of earth as compared to portions of far red light reaching earth ground. This converts much of **Pr** form into **Pfr** form thus inducing flowering in LDPs.
- In winter months, however the reverse ratio is observed due to more far red portion reaching earth keep LDPs non- flowering.

Circadian rhythms of change in **Pr** and **Pfr** concentrations are observed in both SDPs as well as LDPs in relation to light and dark periods. It also confirms that phytochrome takes part the in photoperiodism in plants.

During day time, **Pr** is converted into **Pfr** and it get accumulated in the plant.

It inhibits flowering in SDPs but initiates flowering in LDPs.

During dark period, **Pfr** gradually changes into **Pr** form. It stimulates flowering in SDPs and inhibits flowering in LDPs.

The SDPs needs a long dark period. During the long period **Pfr** is converted into **Pr** form which initiates flowering. If the long dark period is interrupted with red light, flowering is inhibited. This is because in red light **Pr** form is converted into **Pfr** form, which inhibits flowering.

If the interruption of dark period by red light is followed by far red light, the flowering is initiated. This is because in far-red light **Pfr** is converted into **Pr** form to initiates flowering.

The nature of light of light to which plants are plants are exposed at the last time shows the maximum response. If red and far red lights are given successively, the last light treatment shows the flowering response in plants.