

Difference Between Photoperiodism and Phototropism

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Key Difference – Photoperiodism vs Phototropism

Plants have a special ability to respond to light which allows them to adapt to the environmental conditions and enhance their growth. This response is non-[photosynthesis](#) related and plants may respond to different [wave lengths](#) of light. Sunlight is an important factor for seed germination in some plants. These seeds only germinate once they receive an ample amount of sunlight. In plants, the light is sensed by a special type of light sensing molecules known as photoreceptors. The photoreceptor consists of a protein that associate a special light absorbing molecule known as a chromophore. Once the chromophore receives a particular light [stimulus](#) and absorbs light, it makes changes in the structure of the protein which alter its function and results in initiating a signaling pathway. With respect to the light stimulus, the signaling pathway causes particular responses which include changes in gene expression that results in variation in growth and [hormone](#) production. **Phototropism is a directional related response which causes the plants to respond to a particular stimulus of light which allow them to grow towards the source of the stimulus or away from it. Photoperiodism is a regulatory process which causes the regulation of development of a particular plant in response to the length of day or night.** This is the key difference between photoperiodism and phototropism.

What is Photoperiodism?

Photoperiodism is a regulatory process of the development of an organism with respect to the length of the day or night. It is common in both plants and animals. In plants, a particular length of day or night is required for them to flower and then switch to the reproductive stage of its life cycle. The length of day or night is sensed by a special type of photoreceptor protein known as phytochrome. According to this theory, plants are of two different types: short day plants and long day plants. The flowering of short day plants occurs when the night length surpass the relative threshold level of the photoperiod. In other terms, this phenomenon occurs due to the drop in the day length below a specific threshold level. Rice is an example of short day plants.



Figure 01: Short day plant – Rice

Long day plants flower when the night length drops below the threshold level of the photoperiod. This means, a long day plants flower when the day length increases above the critical threshold level. Plants like spinach and barley are examples of long day plants.

What is Phototropism?

Phototropism is an important aspect in plants which allow them to respond to a particular stimulus of light. This response to stimulus causes a series of reactions involving different molecules that create a growth response towards the source of light or away from it. The growth response towards the source of light is known as **positive phototropism** whilst the response away from it is referred to as **negative phototropism**. In a plant, the regions above the ground level such as the [shoot](#) demonstrate positive phototropism; this allows the green plants to grow towards the source of light which enhances the process of photosynthesis. The [roots](#) of the plant show negative phototropism which makes them grow away from the source of light. If a particular plant is affected by the shade of surrounding plants and receives a low quantity of light, positive

phototropism allows them to compete with the surrounding plants and grow towards the light in order to gain a considerable portion of sunlight. Phototropism is regulated by several signaling molecules, mainly by the plant hormone [Auxin](#). This process is coordinated directly due to different concentrations of Auxin distributions in the plant.



Figure 02: Phototropism

What are the similarities difference between Photoperiodism and Phototropism?

- Photoperiodism and phototropism respond to the stimulus of light and contain molecules for absorption of light and for regulation.
- Both processes are controlled by hormones.
- They share a common source of stimulus which is light.

What is the difference between Photoperiodism and Phototropism?

Photoperiodism vs Phototropism

Photoperiodism is the regulation of plant development in response to the length of day

Phototropism is the growth response of a plant according to the direction of the

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|---|---|
| or night. | light. |
| Site of Reaction | |
| The stimulus of photoperiodism is the length of the day or night. | The direction of light is the stimulus of phototropism. |
| Hormones | |
| Flowering is induced by cytokinin and GA in photoperiodism. | Phototropism is regulated by auxin. |

Summary – Photoperiodism vs Phototropism

Plants respond to the stimulus of light. The response differs according to the wave lengths of the light. Responding to the stimulus of light is a non-photosynthetic process. Phototropism is the growth response of a particular plant in response to the direction of the light. The shoot of a plant show positive phototropism and the root of a plant show negative phototropism. Photoperiodism is the regulation of flowering and other development processes of a plant with respect to the length of the day or night. Based on photoperiodism theory, plants are of two types: short day plants and long day plants. Here, the flowering is induced according to the length of day or night. This is the difference between photoperiodism and phototropism. However, these two phenomena share a common stimulus, which is light, and respond according to different regulatory molecules such as hormones and photoreceptors.

References:

1. “Photoperiodism.” Khan Academy, [Available here](#). Accessed 17 Aug. 2017.
2. “What Is Phototropism? – Definition, Experiments & Examples” Study.com, [Available here](#). Accessed 17 Aug. 2017

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