

Manipulation on photoperiod to further control plants

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Introduction

Plants can tell when to flower or drop its leaves by knowing what time of year it is. They can do so by detecting the length of each day, or the photoperiod. This is done as a result of a hormone balance within the plant. While the plant is receiving sunlight a certain hormone called photochrome is converted into a different form. When the plant is not receiving sunlight the hormone is converted back at a set rate. This allows a plant to recognize the relative length of the days. For example a plant that is supposed to flower in the fall will do so when the original form of the hormone is more prevalent, and thus the days are shorter (see figure 1). This also applies to spring flowering plants, which flower when the days are longer, and thus more of the altered form of the hormone is present. As well, this is one of the ways that deciduous plants know when to drop their leaves for winter.

Applications

This mechanism of plants can be very useful to control when plants flower, and drop their leaves. It can be very useful in plant production to be able to control when a plant will flower. Especially if you are using that plant for seed in order to produce more plants. This control can be helpful so that you can get the plant to go to seed in time for you to use the seed. Also, if you wish to get as much seed as possible, you can delay the plant from flowering, letting it get bigger, so that when you do finally let it flower, the crop of seed will be greater. Furthermore, the control of when a plant drops its leaves and becomes dormant makes it so that you can produce bare root plant material to be easily shipped whenever you want.

How to apply the concept

To delay the flowering of your plant you must first know what time of year your plant flowers. If it naturally flowers in the fall, it is signaled to do so by the shorter days. Oppositely, if your plant flowers in the spring it is signaled to do so by the long days.

If you wish to delay the flowering of a short day plant, you will need to artificially lengthen the day. This can be done by extending the day with growing lamps. The length that you need to extend the day will depend on the species. For example, a certain short day plant will not flower if the days are longer than 12 hours. So, in order to prevent the plant from flowering you will leave grow lamps on so that the days will be no shorter than 12 hours. Another type of treatment that works on some species is to interrupt the night cycle with a small period of light (see figure 1). To induce flowering gradually shorten the days, either by turning off the grow lamps earlier, stop interrupting the night cycle, or by covering the plants if it is light outside more than 12 hours.

If you wish to delay the flowering of a long day plant you need to do the opposite from the short day plants. This is done by keeping the days artificially short, making the plant

think it is not yet fully spring. For example to keep the plant from flowering you can cover the windows of the greenhouse, or take the plants into a room with no windows so that they do not get more than 12 hours of sun each day (see figure 1). To induce flowering you simply expose the plants to more than 12 hours of light each day. A similar method can be applied to control when your plants drop their leaves and become dormant. To do this the plant must think that it is getting late in the season and thus close to winter. This can be done by shortening the photoperiod gradually. The plant will then think that winter is approaching, and drop its leaves.

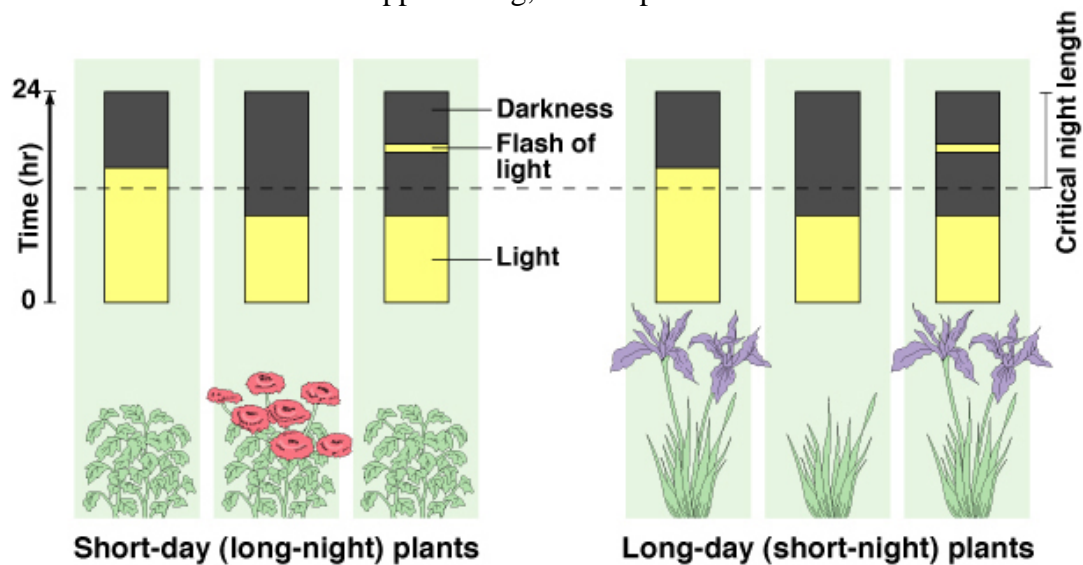


Figure 1. The effect of day length on flowering.

Conclusion

While most people will not need to employ this manipulation technique it can be very useful for those who are concerned with the specific time that something flowers or drops its leaves. This method can be employed in a variety of ways for different prices. The system could be something as simple as a few strings of Christmas lights or UV fluorescent lights on a timer, or something as elaborate as an automated system that takes plants in and out of a dark box (see figure 2). This method has been used for a long time for the flower market, so there is a yearlong supply. It is a simple method which can improve the productivity of seed yields, or fine tune the cycles of your plants to make it easier to plant as bare root.



Figure 2. An automated dark box system

Works Cited

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