

## 24.3 Plant Hormones

### Lesson Objectives

-  Describe the effects of hormones on plant growth and development.
-  Identify three tropisms exhibited in plants.
-  Describe how plants respond to seasonal change.

### Lesson Summary

**Hormones** Living organisms produce chemical signals that affect the growth, activity, and development of cells and tissues. Such a chemical is called a **hormone**.

- ▶ A hormone affects particular **target cells** that have **receptors** to which a particular hormone can bind.
- ▶ There are five major classes of plant hormones.
  - **Auxins** are produced in the apical meristems and cause cell elongation and the growth of new roots. They also inhibit the growth of lateral buds, which produces **apical dominance**. Snipping off the tip of a stem breaks apical dominance and enables branches to develop.
  - **Cytokinins** stimulate cell division and are produced in growing roots and developing fruits and seeds.
  - **Gibberellins** stimulate the growth of stems and fruits. They also stimulate seed germination.
  - **Abscisic acid** inhibits cell division and causes seed dormancy.
  - **Ethylene** is a gas that stimulates fruit ripening and causes plants to seal off and drop organs such as leaves and fruits that are no longer needed.

### Tropisms and Rapid Movements

- ▶ **Tropisms** are growth responses to environmental stimuli, which cause elongating stems and roots to bend.
  - **Phototropism** is a response to light.
  - **Gravitropism** is a response to gravity.
  - **Thigmotropism** is a response to touch.
- ▶ Rapid movements such as the closing of leaves when touched are caused by changes in cell walls and in osmotic pressure in certain cells.

**Response to Seasons** Plants have regular cycles in their patterns of growth, development, and flowering that are tied to seasonal changes. One environmental stimulus that changes with the seasons is the **photoperiod**, the relative length of the light and dark periods in a day. A plant pigment called phytochrome causes a plant's response to the photoperiod.

- ▶ The timing of flowering is one plant response to the photoperiod.
- ▶ Preparations for winter dormancy, which include leaf loss and the formation of scales around terminal buds, are also responses to the photoperiod.

## Hormones

1. What is a hormone?

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2. What are the functions of hormones in plants?

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3. What is a target cell?

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4. Briefly describe the experiments that Charles and Francis Darwin performed on grass seedlings.

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*For Questions 5–19, match the action with the plant hormone that produces it. Hormones may be used more than once.*

### Action

- \_\_\_\_\_ 5. May oppose the effects of auxins
- \_\_\_\_\_ 6. Promotes cell elongation
- \_\_\_\_\_ 7. Causes petals and leaves to drop
- \_\_\_\_\_ 8. Promotes seed germination
- \_\_\_\_\_ 9. Promotes seed dormancy
- \_\_\_\_\_ 10. Stimulates cell division
- \_\_\_\_\_ 11. Causes the enlargement of fruits
- \_\_\_\_\_ 12. Causes apical dominance
- \_\_\_\_\_ 13. Stimulates fruit ripening
- \_\_\_\_\_ 14. Forms in growing roots
- \_\_\_\_\_ 15. Forms in aging leaves and flowers
- \_\_\_\_\_ 16. Opposes the effects of abscisic acid
- \_\_\_\_\_ 17. Stimulates dramatic stem growth
- \_\_\_\_\_ 18. Stimulates new root growth
- \_\_\_\_\_ 19. Inhibits cell division

### Plant Hormone

- A. abscisic acid
- B. auxin
- C. cytokinins
- D. ethylene
- E. gibberellin

## Tropisms and Rapid Movements

20. What is a tropism?

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21. What causes the bending of stems and roots in tropisms? Give an example.

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22. Complete the table about plant tropisms.

| Plant Tropisms |                                  |         |
|----------------|----------------------------------|---------|
| Tropism        | Definition                       | Example |
| Gravitropism   |                                  |         |
| Phototropism   |                                  |         |
|                | The response of a plant to touch |         |

23. How are the speed and causes of rapid movements of plants different from the speed and causes of tropisms?

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24. List two examples of rapid movements that occur in plants.

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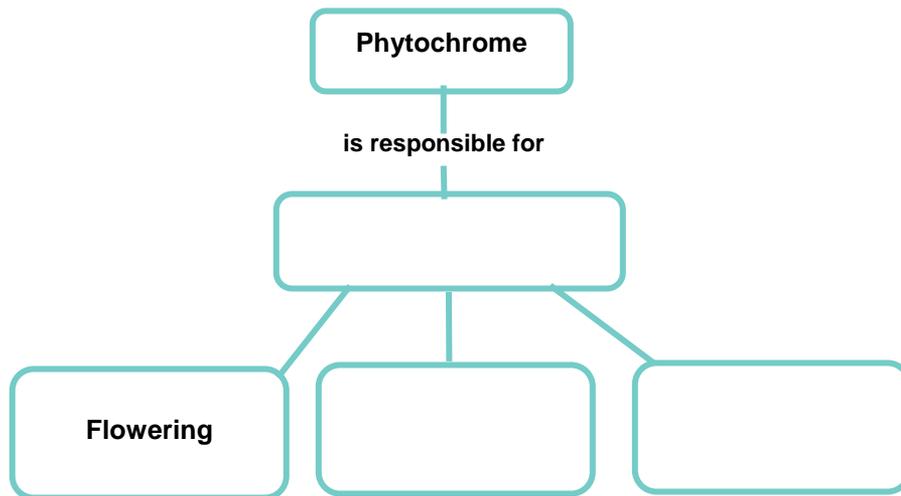


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## Response to Seasons

For Questions 25–28, complete each statement by writing the correct word or words.

25. Plants that flower when nights are longer than days are called \_\_\_\_\_ plants.
26. Irises that flower in summer when nights are short are called \_\_\_\_\_ plants.
27. The relative lengths of the light and dark times in a day are a stimulus called the \_\_\_\_\_.
28. The chemical that causes the seasonal responses of plants is a type of light-sensitive chemical called a(n) \_\_\_\_\_.
29. Complete the concept map that summarizes the role of phytochrome in plants.



### Apply the Big idea

30. You have been asked to suggest a flowering plant that would bloom and beautify a lighted parking lot. The parking lot is only dark between midnight and sunrise. What information should you research about the plants you consider? Explain your answer.

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