Colorado Master Gardener

GARDENING SERIES

Colorado MASTER GARDENER

Plant Growth Factors: Plant Hormones

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Outline. . .

Thought Questions:

- A couple of times a year, I sheer my shrubs into nice rounded shapes. Now my shrubs have large woody stems with a lot of dead branches. How do I correct this?
- I put a stake next to a small tree trunk to keep it straight. When I took it off a year later the trunk had a worse bend than before. Why?

Another factor in plant growth is the influence of plant hormones. **Hormones** are chemicals produced by plants that regulate the growth processes.

Plant growth regulators are chemicals applied by a horticulturist to regulate plant growth. In plant propagation, cuttings are dipped in a rooting hormone to stimulate root development. In greenhouse production, many potted flowering plants (like poinsettias and Easter lilies) may be treated with plant growth regulators to keep them short. Seedless grapes are treated with plant growth regulators to increase the size of the fruit. In special situations, turf may be treated to slow growth and the need for mowing. Because plant growth regulators are effective in parts per million or parts per billion, they have little application in home gardening.

Plant Hormones

Different hormones affect different plant processes. Understanding how hormones work allows horticulturists to manipulate plants for specific purposes.

Auxins affect cell elongation (tropism), apical dominance, and fruit drop or retention.

Gibberellins affect:

- the rate of cell division,
- flowering,
- increase in size of leaves and fruits,
- seed and bud dormancy, and
- induction of growth at lower temperatures (used to green up lawns 2 to 3 weeks earlier).

Cytokinins promote cell division, and influence cell differentiation and aging of leaves.

Abscisic acid is considered the stress hormone. It inhibits the effects of other hormones to reduce growth during times of plant stress.

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Putting Knowledge to Work

Figure 1. Auxin produced in the rapidly growing terminal buds suppresses growth of side buds, giving a young tree a more upright form. As growth rates slow with age, reduction in apical dominance gives the maturing tree a more rounded crown.

Hormones Impact Pruning

Understanding hormones is key to proper pruning.

Auxin produced in the terminal buds suppresses the growth of side buds and stimulates root growth.

Gibberellins produced in the root growing tips stimulate shoot growth. Pruning a newly planted tree removes the auxin, slowing root regeneration.

Figure 2. **Auxin** produced in the canopy growing tips stimulates root growth. **Gibberellins** produced in the root growing tips stimulate canopy growth.

Heading cuts (removal of a branch tip) releases the apical dominance caused by auxin from the terminal bud. This allows side shoots to develop and the branch becomes bushier. On the other hand, **thinning cuts** remove a branch back to the branch union (crotch). This type of cut opens the plant to more light. Most pruning should be limited to thinning cuts. For more information on pruning, refer to the following Cooperative Extension fact sheets.

- 7.821, *Pruning Cuts*
- 7.824, *Structural Training: Pruning Flow Chart*
- 7.825, *Pruning Mature Shade Trees*
- 7.826, *Pruning Flowering Shrubs*
- 7.827, *Pruning Evergreens*

Figure 3. A **heading cut** releases apical dominance and the branch becomes denser as the lateral buds begin to grow (left). A **thinning cut** removes a branch back at a branch union (crotch), opening the plant for better light penetration (right). Thinning cuts promote an open growth habit by redirecting sugars to the terminal shoots.

Tropisms

Auxin also plays a key role in **tropism** (controlling the direction of plant growth).

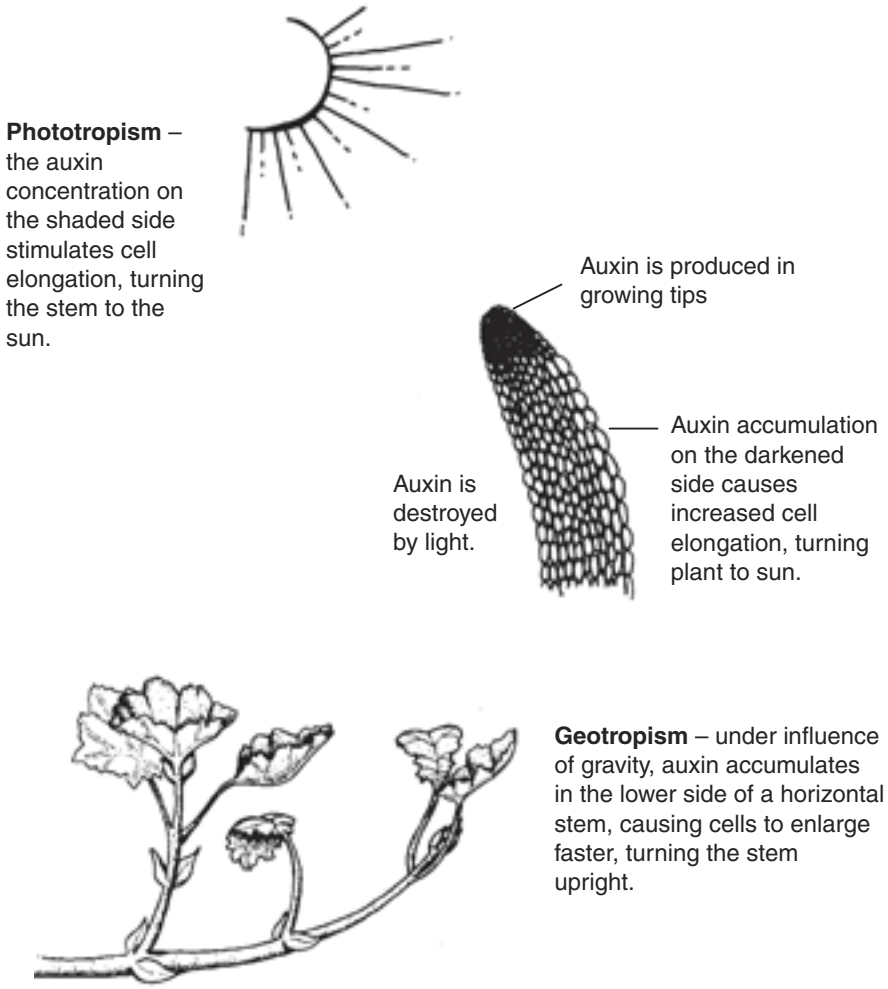

Figure 4. The effect of auxin on tropism.

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