

As you may remember, last week I looked at what plant hormones are, and what they do. Specifically we looked at auxin and cytokinin, and their roles in plant development. Auxin is responsible for the direction that the plant grows in, as well as the way that the plant branches. A synthetic version can also be used as an herbicide. Cytokinin is the opposite and balancing factor of auxin, contributing to root growth and cell elongation. This week I'll look at abscisic acid, ethylene, and gibberellins.

Abscisic Acid, also known as ABA, was thought for many years to control the abscission, or dropping, of leaves and fruit from trees and was named for the abscission process. This is actually a misnomer, because abscisic acid does not directly impact abscission. It does directly impact seed dormancy, environmental response, and reduce transpiration. ABA keeps seeds dormant, or asleep, while they are on the plant and while the environment outside of the seed is not an ideal environment for germination of the seed. If you have ever sliced open a tomato or a pumpkin that has a growing seed on the inside, this is due to a lack of abscisic acid. On all plants, there are tiny openings on the leaves that can be opened or closed depending on the environmental conditions. These "mouths" are called stomata. This hormone is also responsible for closing the stomata to prevent water loss through the leaves. Plants close their stomata during the hottest part of the day to help keep water molecules from escaping.

If you have ever left a bunch of bananas on your kitchen counter and watched them get more and more brown as the days go by, you've witnessed the effects of ethylene. Ethylene is the plant hormone that is responsible for ripening and dropping of fruit and leaves from plants. It is produced as a gas, and will be produced more in fruit that are injured. The saying goes "one bad apple spoils the whole bunch", is scientifically accurate because one damaged apple will produce more ethylene, accelerating the ripening of the fruit around it. This is also why certain fruits, such as apples, shouldn't be stored in a refrigerator. The ethylene concentration will build up and cause the shelf life of the fruit to shorten. This can work to your advantage however. If you put a few bananas in a paper bag with an apple that isn't quite soft enough to eat, it will soften faster than it would on its own. The knowledge of the way that ethylene affects produce changed how produce is shipped, allowing for a longer shelf life. When produce is shipped and stored, ethylene scrubbers are used to remove the ethylene from the air, slowing down the ripening process. This process is also used when fresh cut flowers are being shipped.

Much like auxin and cytokinin being on different sides of a seesaw, gibberellin and abscisic acid work the same way. Abscisic acid suppresses seed germination and gibberellin causes seeds to germinate. Gibberellin can also be used to keep plants, like grass, short and manageable, although the cost may outweigh the benefits. This hormone is also used by plants to start the formation of flower buds. Commercial growers use it to control when plants start flowering.

Auxin, cytokinin, abscisic acid, ethylene and gibberellin are essential for normal plant growth. In this article I have broken down specific roles for each hormone, but they all work in tandem with each other. Understanding how the hormones work and affect plant growth can allow the hormones to be used to our benefit, and the plants. If you have any questions, please contact me at the Buffalo County Extension Office, 308-236-1235, or at mearnest2@unl.edu.