

One of today's hot topics is the development of nutraceuticals — a combination of the words “nutrition” and “pharmaceutical.” Food used as medicine has the benefit of combining desirable therapeutic effects with reduced side effects associated with traditional pharmaceutical drugs. Food was used thousands of years ago as medicine, but it wasn't until the 1980s that the modern nutraceutical era was born in Japan.

Plants have been known for centuries to have medicinal properties. One of the earliest reports of that dates back to the preeminent Greek philosopher and doctor Hippocrates, who encouraged women in the fourth century B.C. to chew willow leaves to relieve pain during childbirth. Over the centuries the extract from willow was purified and eventually called salicylic acid. The demand for this natural painkiller led to the development of synthetic versions that were relatively inexpensive. In 1899, Bayer marketed an over-the-counter version of salicylic acid known by its common name: aspirin.

Although not new, the interest in salicylic acid and other plant-beneficial hormones has only taken place in the last 20 to 30 years. Salicylic acid is important as a plant signal, or hormone, that stimulates the plant's defenses in response to a pathogen attack. In an oversimplification of the plant/disease interaction, plants recognize pathogens and mount a defense through the production of specific proteins by host-resistant genes. If the plant lacks the corresponding pathogen-resistant gene, it cannot activate its defense mechanism quickly or intensely enough to fight off the pathogen. The signaling effect of salicylic acid becomes apparent when a turfgrass plant has a hypersensitive, early defense response to a pathogen attack. A hypersensitive response occurs at the point of pathogen entry, where the plant sacrifices cells around the infection point, producing a lesion in an attempt to isolate the pathogen.

Not a lot is known about the impact of salicylic acid on turf. Nearly all the research has been done on dicots. Research on monocots in general and turf specifically is limited.

Activating the Plant's Defenses

BY KARL DANNEBERGER



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However, the application of salicylic acid, its derivatives, or associated hormones, which are known as plant activators, are commercially available in Europe and other places. Plant activators like acibenzolar-s-methyl (benzothiadiazole) have been tried on rice, wheat and several vegetables. When applied topically, benzothiadiazole has shown some protection against diseases like rust and powdery mildew.

On turf, where research is much more limited, benzothiadiazole has shown some promise. In a study conducted at Kansas State University, researchers found that benzothiadiazole applied during the season could significantly reduce dollar spot compared to an untreated control on various creeping bentgrass cultivars. Applications of benzothiadiazole had to be made throughout the growing season. Although dollar spot was reduced by the applications, no effect was found in reducing brown patch.

With increased government and environmental pressure on this industry to reduce pesticide use on turf, the battle to control diseases will need to be fought a number of different ways. One plan of attack is to activate the plant's own defense mechanism by applying the appropriate plant activator (plant and disease dependent) that can reduce the incidence and severity of disease.

I believe we will see the use of plant activators tested, which is already underway, in combination with fungicides that may extend the period of control, and/or reduce the fungicide rate. Although that promise is there, sound science will be required in order for us to know what the advantages and limitations of plant activators are.

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