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Turfgrass Program

The College of the Environment and Life Sciences

Golf Course Superintendents Factsheet Series

Bacterial Wilt

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BACTERIAL WILT of annual bluegrass is the only known bacterial disease of the cool-season turf grasses, caused by the pathogen *Xanthomonas translucens* pathovar *poae*. It is restricted to annual bluegrass (*Poa annua*) when observed in the field but it has been successfully inoculated onto a limited number of other grass species, notably *Poa trivialis*. However, it has never been isolated from a stand of *P. trivialis* on a golf course or in nature.

While many people think this disease is a phenomenon generally limited to the East Coast, bacterial wilt of annual bluegrass appears to have a wide geographic range. The URI Turfgrass Disease Diagnostic Lab has confirmed isolates of the pathogen from Rhode Island, Connecticut, Massachusetts, New Hampshire, Pennsylvania and Montana. It has been widely reported in Japan and has been suspected to be present in Southern California.

So what should superintendents know about bacterial wilt? And what can be done about it? The history of "bacterial wilt" is an important first consideration. While bacterial wilt was originally identified on creeping bentgrass in the 1970's, the organism currently affecting grass in the Northeast CANNOT attack bentgrass. The original bacterial wilt of bentgrass generally only affected one host, the Toronto C-15 variety of creeping bentgrass. This particular form of the pathogen has not been officially observed in some time. Bacterial wilt of annual bluegrass was not identified until 1985, in the lab of Dr. Joseph Vargas.

It is also important to keep in mind that bacterial wilt normally doesn't cause a problem for the majority of golf courses. In any backyard you will probably find annual bluegrass, some of it harboring the pathogen, and it will usually be quite content, unaffected by the disease. This is because the bacterial wilt organism is a very weak pathogen. Under most circumstances, it spends its life as an epiphyte, that is, living on the outside of plants and in the tips of cut blades (not as a pathogen, but a saprobe). In all likelihood, the bacterial wilt pathogen is present on most golf courses, regardless of whether or not disease has been observed. Bacterial wilt only takes hold when the host plant has been so environmentally stressed that it can no longer fend off disease. It is often considered "the nail in the coffin" of diseased turf. On rare occasions, it may be seen in fairways. When it does infect fairway turf, it is more of a nuisance than anything else. Commonly it will cause

rapid growth and etiolated tissue on fairways (meaning constant daily mowing to keep it the turf looking neat).

Like any disease, weather has a lot to do with the spread of bacterial wilt. The bacteria grow most rapidly at 86°F but can reproduce adequately at temperatures as low as 60°F, causing problems from April until October. The pathogen spreads best with lots of water, generally when the temperatures are high. However, it causes most of its damage during heat and drought, when the plant simply cannot keep up water demand. The pathogen is least capable when weather conditions are cool and dry. During these periods the disease will rapidly slow down. Humidity can be important too; high humidity keeps the plant from wilting but does not provide free water for bacterial multiplication.



Figure 1. *Poa annua* plants infected by bacterial wilt appear wilted, twisted and necrotic at higher cuts.

Bacterial wilt is often seen on greens that have experienced a lot of winter damage. We speculate that the wet, dead tissue provides a good environment for bacterial multiplication. When population levels reach a certain threshold, the bacteria essentially "spill" into the plants. We know from laboratory studies that a small number of bacteria won't cause disease. A very specific minimum amount of bacteria are needed before disease is observed. In some cases, bacterial wilt is exacerbated or simply found in conjunction with cool-season *Pythium* root rot. We have yet to explain this phenomenon, although it may simply be coincidental.

So, should you be worried that bacterial wilt is probably already lurking on your course? Probably not. Our research indicates that only annual bluegrass is threatened most of the time and only under the most severe circumstances. Japanese researchers have demonstrated that there are even multiple strains, some of which are very aggressive while others are quite innocuous.

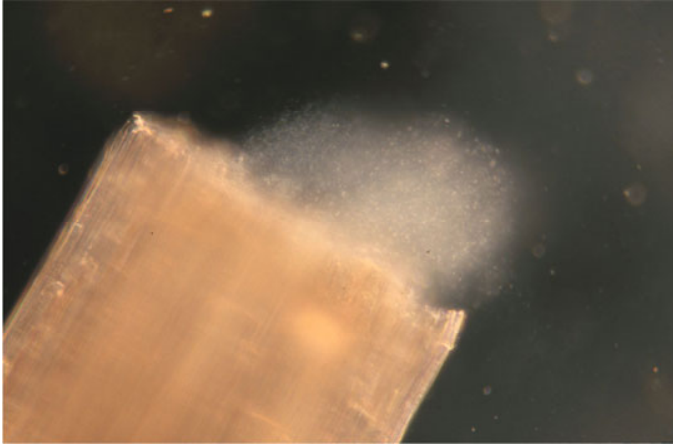


Figure 2. *Poa annua* leaves will stream bacteria from vascular elements when clipped, placed in a drop of water and viewed under the compound microscope.

In the United States, there tends to be two levels of virulence. The highly virulent strain can kill grass quickly, in less than a week. The less virulent strain can take as long as a month before symptoms are observed. This may explain why the greens on one particular course are getting pummeled and those two miles down the road are barely seeing symptoms. In general, you should worry about bacterial wilt if your greens are taking a beating, particularly if you have a history of Anthracnose, have primarily annual bluegrass, have a lot of compaction, a lot of traffic and are cutting under 1/8 of an inch. If you are pushing your greens too hard, you could have a problem.

Chemical Control: If bacterial wilt is already present, there is no easy solution. When we deal with fungal diseases, there is no end to the "quick-fixes". Fungicides are in abundant supply and they are extremely effective. There are no "quick-fixes" for bacterial wilt. The chemicals we do have only slow disease spread but do not eliminate it. Copper fungicides (Kocide and Junction) and Zeritol are a good example. They have a wide biocidal range and will kill most microorganisms they come into contact with (the key word being

"contact"). But they will not affect diseased tissue. In addition, they need to be applied regularly every 7-10 days, being very careful not to burn turf.

Cultural Control: The bacteria colonize the vascular system of affected plants and can only enter a host through a wound. Mowing provides constant wounding and is the best way to spread the disease. Grasses that are inoculated artificially and never cut will often recover quite well over time. Because this is not a viable option on a golf course, the next best practice is to sterilize reels, bedknives and rollers between greens. Reducing turfgrass stress can also mitigate the disease. Raising the height of cut, potentially increasing fertilizer, reducing traffic and aggressively minimizing compaction can alleviate the problem. The best solution is to get rid of your annual bluegrass (simple, right?) because bentgrass is just not susceptible to this disease. Some superintendents have had success managing the pathogen by aggressively over-seeding in the spring (8-10x per season) with newer bentgrass varieties.

Bacterial wilt is a difficult disease to manage. And it can pop up just when you thought things couldn't get worse. Control options are limited and have had a spotty record of success. Ultimately, we may just have to accept slower greens on those courses that have a problem with the disease. And while we are still a few years away, herbicide tolerant bentgrasses may provide a real long-term solution to this disease.

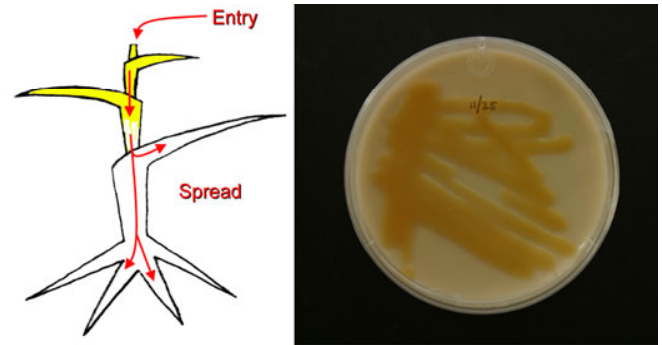


Figure 3. The most likely mode of entry and spread of infected *P. annua* plants and the causal agent, *X. t. pv. poae*, in culture.

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