

Weed Management Update

by Wendy Gelernter, Ph.D. and Larry J. Stowell, Ph.D.

Bottom line: 1) Knotweed has become one of the more difficult weeds to control on the golf course. Easing compaction via aeration can help reduce its growth, but when herbicides are required, university testing indicates that there are at least four options: 2,4-D plus MCPP, 2,4-D plus MCPP plus dicamba, triclopyr plus clopyralid or dicamba alone. For all products, monthly applications, made when plants are small (springtime) will be the most successful. 2) Poa control on overseeded fairways has been assisted by the development of paclobutrazole (Trimmit, TGR Turf Enhancer) and bispyribac (Velocity), both of which have shown good results in tests around the country. Along with ethofumesate (Prograss), these products are important tools in poa management. Paclobutrazole is also labeled for use on bentgrass greens, making it one of the few effective poa control products available for this use. 3) Finally, new moss control data from North Carolina State University indicates that chlorothalonil applications are less successful during cooler weather, an observation that may explain the variable performance of this product from location to location. The good news is that the herbicide carfentrazone (QuickSilver) may have potential as a moss control product that can be safely used on poa and bentgrass greens.

Knotweed: becoming more troublesome

Knotweed, a broadleaved, annual weed, has become more widespread, and more difficult to control on golf courses. The weed is known by several different common names — **prostrate knotweed** and **common knotweed** are the most common, and also by several different scientific names (*Polygonum aviculare*, *Polygonum arenastrum*, *Polygonum montereyense*). Knotweed is part of a larger family of plants known as Polygonaceae, or buckwheat family. Other weeds in the buckwheat family include smartweed, red sorrel and curly dock.

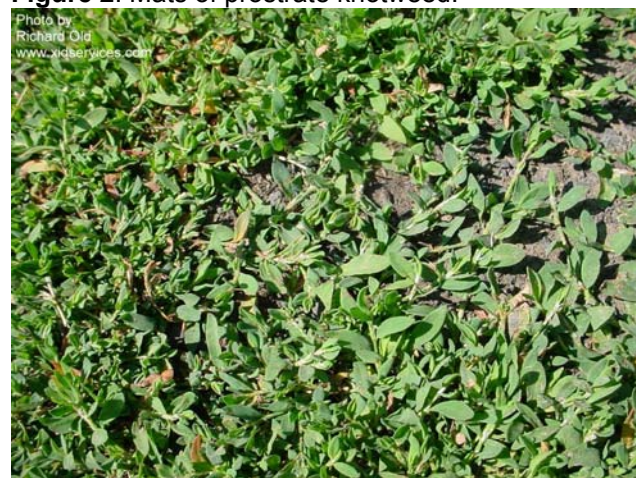
Figure 1. Prostrate (or common) knotweed. Note the very small white flowers that appear in the upper leaf axils. Flower color can vary from white, to green to pinkish. Flowering begins in March and may continue through October.



Knotweed is characterized by its tendency to form dense, horizontally expanding mats (Figure 2) that can reach 3 to 4 feet in diameter. The plant's thin, multiply branching wiry stems have stem nodes that are slightly swollen at each joint, which gives them

the "knot-like" appearance for which the plant is named. The leaves are small (1/2 to 1 1/2 inches long), oval and bluish green in color. The flowers, which during the spring and summer, are inconspicuous (Figure 1). When subjected to regular mowing, knotweed becomes more compact in growth, and can sometimes be mistaken for spotted spurge. While prostrate (common) knotweed occurs throughout North America and Europe, a second knotweed species, **silver-sheathed knotweed** (*Polygonum argyrocoleon*) occurs primarily in Southern California and Arizona, where it also causes problems on golf courses. It has more erect plants that can reach 20 inches in height. The pink flowers of this species are borne on long, leafless spikes.

Figure 2. Mats of prostrate knotweed.



There are a few other important weeds with similar names, though not similar appearance to the knotweeds mentioned above. **Japanese knotweed**, (*Polygonum cuspidatum*) is a perennial broad-leaved plant, 4 – 8 feet in height, that grows in a shrub-like

habit. This weed is extremely invasive and regarded as noxious in many parts of the world. It is not yet a serious problem on golf courses, however.

Knotgrass (*Paspalum distichum*), is a grassy, perennial weed that is closely related to dallisgrass, and is a common problem on golf courses. Because it is a grass and not a broad-leaved plant, it is not related to knotweed at all.

Management of knotweed begins with cultural practices. This weed thrives in heavily trafficked, compacted areas with low fertility. Aerification and light applications of nitrogen can help to encourage turfgrass growth and discourage further invasion by this pest. Where herbicides are necessary, post-emerge applications of the products listed in Table 1 (page 2) have shown moderate levels of activity. No one product appears to be a silver bullet for this weed, and performance of the products appear to vary from region to region. This means that you may have to try side-by-side tests of a few different materials to find out what works best for you. It also means that multiple applications (usually 21 – 28 days apart) will be necessary, and that earlier (springtime) applications, made when the plants are smaller, will be most effective.

Table 1. Herbicide active ingredients (and some of the associated commercial products) that have shown activity against knotweed in university trials. Always read the most current label to confirm use directions.

Active Ingredient	Commercial (trade) name	Company
2,4-D plus mecoprop (MCP)	2 Plus 2	Amrep
	MCP-2	Nufarm
2,4-D & dicamba & mecoprop (MCP)	Bentgrass selective	Lesco
	Three way selective	Lesco
	Triplet	NuFarm
	Trimec	PBI Gordon
Clopyralid & triclopyr	Confront	Dow AgroSciences
Dicamba	Banvel	Micro Flo
	Vanquish	Syngenta

Velocity for poa control

A new herbicide chemistry from Valent, Velocity (byspiribac) is closely related to the sulfonyleurea group of herbicides. However, unlike most sulfonyleureas, Velocity is specific for *Poa annua* (both annual and perennial biotypes), and does not take out ryegrass, bentgrass or other cool season turf. For this reason, it can be used as a post-emergent

control product to remove poa on fairways of bentgrass and ryegrass (overseeded and non-overseeded). The product does not yet have a federal registration (it is expected soon), but has been granted a “Special Local Needs” (24C) label from EPA in the selected states of FL, GA, MI, NC, NJ, SC, TX.

Figure 3. Velocity field trial on ryegrass-overseeded bermudagrass fairways. Pelican Hill Golf Club, Steve Thomas, superintendent. March 23, 2004. Trial was conducted by Jack Schlesselman and Erin Nachbar, Valent Professional Products. Note that all treatments (except the untreated control plots, which are indicated by yellow arrows) did an excellent job of controlling poa (untreated areas are light colored due to prevalence of poa seedheads, while treated areas are dark green with ryegrass).



Prograss (ethofumesate) is currently the product of choice for poa removal on rye and bentgrass fairways. It has been compared against Velocity in several trials around the country, including one at Pelican Hills Golf Course (Newport Coast, CA; Steve Thomas, superintendent). Results from this trial mirrored those seen elsewhere in the country, and are illustrated in Figures 3, 4 and 5. In summary, the results show that:

- On overseeded fairways, two monthly applications of Velocity (in January and February) at 1.3 oz/acre provided the best poa control with the least damage to ryegrass.
- This treatment regime provided comparable control to two applications of Prograss
- Prograss is still a very useful tool, but has some limitations that Velocity will help to address. These include its harshness against non-dormant bermudagrass (see Figure 5), and the likelihood that poa resistance will develop if it is used exclusively for poa control over a period of years.

- In areas where Prograss can be safely used on overseeded bermudagrass (where the climate is cold enough to produce dormancy in bermudagrass), Prograss and Velocity can be rotated from one year to the next as part of a solid resistance management program. In areas where Prograss cannot be safely used on overseeded fairways (due to lack of dormancy in bermudagrass), then Velocity will provide a good new tool for poa management.

Figure 4. Quality of ryegrass overseeded fairways after two applications of Velocity or Prograss. March 23, 2004. Pelican Hill Golf Club, Steve Thomas, superintendent. Trial was conducted by Jack Schlesselman and Erin Nachbar, Valent Professional Products. All treatments produced greater than 97% control of poa, but the higher rates of Velocity caused some decrease in ryegrass quality. For this reason, the 1.3 oz/A rate of Velocity is the safest and most effective rate for use.

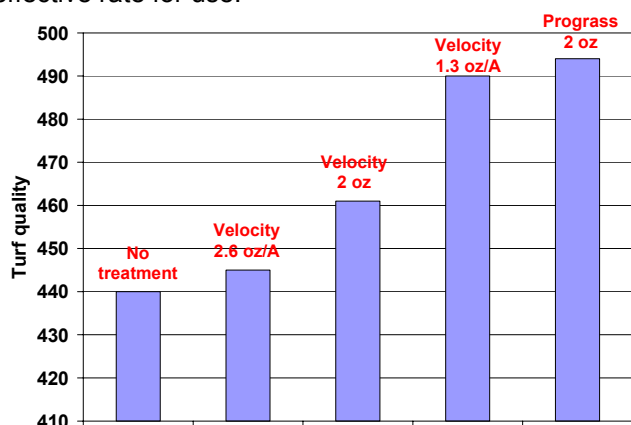


Figure 5. Impact of wintertime applications of Velocity and Prograss on bermudagrass activity. Pelican Hills Golf Club, August 2, 2004. Note that the plot treated with Prograss (arrow) has little or no bermudagrass present. This is because the Prograss was applied when bermudagrass was still green (non-dormant), which caused significant damage to the Bermuda. In contrast, nearby Velocity plots are a mixture of ryegrass and bermudagrass.



The manufacturers recommend avoiding Velocity applications when air temperatures are below 50F, as the slow growth of ryegrass at this temperature may result in some damage to the rye. The product will not be labeled for use on greens, and should not be used on non-overseeded bermudagrass.

On bentgrass fairways, the strategy is quite different, with multiple applications timed for later in the year (May 15 – September 1) against poa.

And more on poa control

Paclobutrazole (Trimmit; TGR Turf Enhancer) also has an important role to play in poa control programs — not only on overseeded fairways, but on bentgrass greens as well. This product, which is not an herbicide but is instead a plant growth regulator, does not actually kill poa. Instead, it regulates its growth so that rye or bentgrass can outcompete it (Figure 6).

Figure 6. Growth suppression of *Poa annua* with paclobutrazole. Note that *Poa annua* (arrow) is much more suppressed in growth than the surrounding bentgrass plants. This differential suppression allows bentgrass to gradually outcompete poa. Photo courtesy of Dean Mosdell, Syngenta.



On bentgrass greens, Trimmit has been most successfully used in a multi-year program that seeks to gradually remove poa from the greens. Rates of 6.4 oz/A applied monthly in the spring and again in the fall appear to provide good regulation of poa without damaging bentgrass. This program works best, however, in warmer climates where bentgrass has a competitive advantage over *Poa annua*. In cooler climates, the results are less dramatic.

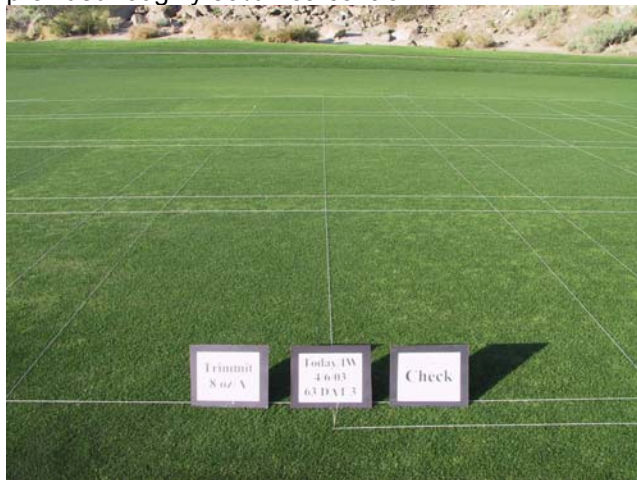
On overseeded fairways, paclobutrazole also provides good control in the 80% range when a product such as Trimmit is applied in three monthly applications of 8 oz/A each during the winter months. Researchers have found that poa control increases to roughly 90% if an application of 13 oz/A of Primo

(trinexpac-ethyl) is made at the time of the first mow after overseeding.

When using paclobutrazole on overseeded fairways, there are two important things to remember.

1. **Bermudagrass is very sensitive to paclobutrazole** (3-4 times more sensitive than poa) to this product. Although the product will not kill bermudagrass, it will slow down its growth dramatically. For this reason, paclobutrazole should not be used during times of the year when bermudagrass growth is desirable.
2. **Paclobutrazole should be applied only after the overseed is well established (85% cover).**

Figure 7. Trimmit (paclobutrazole) on overseeded bermudagrass fairways. Indian Wells Country Club, Indian Wells, CA. David Hay, superintendent. April 6, 2004. Trial was conducted by Mark M. Mahady and Associates. Note the heavy poa infestation in the non-treated (check) plot to the right, and the clean stand of ryegrass in the plot treated with Trimmit (8 oz/A; three wintertime applications). This treatment provided roughly 80% Poa control.



Both Trimmit (Syngenta) and TGR Turf Enhancer (The Andersons) are registered in most locations. However, the products are not yet registered in California.

Where does paclobutrazole fit in poa control programs on overseeded fairways? Because this product acts as a growth regulator and not as an herbicide, it isn't clear whether it would be beneficial to use it in the same time frame as you are using herbicides such as Velocity or Prograss. Instead, until more data is available, they should probably be used in separate years or separate locations. Selection of paclobutrazole vs. either Velocity or Prograss may also be affected by the effect you are looking for. In the case of the herbicides, the results are fast and dramatic — if you have high levels of poa, you will probably be disappointed with the yellowing and bare spots that will result after application. In contrast, the activity of paclobutrazole

is more gradual, and may be especially useful in situations where there are high poa infestations that need to be removed less dramatically.

New moss control information

Moss control continues to be one of the most vexing pest problems that managers of cool season greens face. Although there are many effective moss control products (and combinations of products) available, almost all of them are fairly effective control agents for bentgrass and annual bluegrass as well. So the trick is to find a product that will kill moss (and prevent it from coming back), but be completely safe for use on cool season turf.

In our research, we have consistently found that chlorothalonil (Concorde, Daconil, Echo, Manicure, Thalonil) is the most effective control agent that does not harm turf (see also the moss section in the October, 2003 PACE Insights). While it doesn't eradicate the moss, three weekly or biweekly (every two weeks) applications seem to clear up infestations for several months. These results have been replicated in many locations around the country, but there are some places where chlorothalonil has been ineffective for moss.

Figure 7. Silvery thread moss (*Bryum argenteum*) on a poa/bentgrass green.



Now, Dr. Fred Yelverton of North Carolina State University thinks he may know why. Research from his lab indicates that warm air temperatures — ideally in the 75 – 80F range — are a must if chlorothalonil is to be effective. As air temperatures decrease, so too does the activity of chlorothalonil for moss.

Dr. Yelverton's lab has also recently reported on the efficacy of carfentrazone (sold in the turf market as QuickSilver by FMC) for moss control. Although not currently labeled on greens, this herbicide appears to provide good moss control (65 – 85%) when two applications are made at 0.67 – 3.4 oz/acre. There has been no obvious damage to cool season greens in Yelverton's trials, but further work is needed to confirm the safety of this product for greens height bentgrass and bluegrass.