



- On the Road - Quarterly Bulletin

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English Lawn Daisy Control

By Mark Mahady

By
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English lawn daisy or English daisy (*Bellis perennis*) is the most troublesome and difficult to control broadleaf turfgrass weed in California. English daisy continues to flourish in turf stands (Photograph 1) and frustrate turf managers due to its ability to adapt to a wide range of cultural practices, and to resist and tolerate many of the presently registered broadleaf herbicides.

English daisy is a fibrous rooted perennial with basal leaves and a prostrate, spreading growth habit. The leaves are nearly smooth or loosely hairy, entire margined or variably toothed, broad above, and narrowed at the base to a long stalk. Flower heads are white or pinkish with yellow centers. Flower stalks generally exceed the leaves in length.

This aggressive and troublesome weed spreads through a rapidly advancing rhizome system, and exhibits the potential to root and produce new plants at each node along individual rhizomes. English daisy also appears to be a prolific seed producer. Germinating seedlings have been observed from April until late September. Once established in turf this dual propagation system contributes to the rapid spread and invasion of English daisy in adjacent turfgrass areas. English lawn daisy was introduced from Europe as a garden plant and today there are approximately six species present in California.

During the summer of 2004 a replicated field trial was conducted on a mixed perennial ryegrass/*Poa annua* practice fairway at the Salinas Golf and Country Club located in Salinas, California in order to evaluate herbicide tank mixes for English daisy control. Sequential applications of treatments presented in Table 1 were applied at four-week intervals on May 7 and June 3, 2004. All treatments containing Drive (quinclorac) included Can-Hance (methylated seed oil or MSO) at a rate of 24 product ounces per acre. All remaining treatments include a non-ionic surfactant at a rate of 0.25% volume to volume.

Sequential treatments of Speed Zone (5.0 pt/A) + Drive (0.75 lb ai/A) + Vanquish (0.33 lb ai/A) resulted in 87% control of English lawn daisy eight weeks after the second application on July 29, 2004 (Photograph 2). This tank mix greatly exceeded the performance of all other treatments.

This three-way tank mix

exhibited slight discoloration of *Poa annua* 7 and 14 days after treatment. However, this effect was short-lived and no long-term detrimental effect on surface quality was observed. The Speed Zone + Drive + Vanquish tank mix showed unacceptable injury to kikuygrass.

In another field trial conducted during the summer of 2004 on the #16 fairway at Rancho Canada Golf Club sequential treatments of Speed Zone (5.0 pt/A) + Drive (0.75 lb ai/A) + Vanquish (0.33 lb ai/A) resulted in 82% control of English lawn daisy eight weeks after the second application.

Today this three way mixture of Speed Zone (5.0 pt/A) + Drive (0.75 lb ai/A) + Vanquish (0.33 lb ai/A) represents the best combination of registered products for successful control of English lawn daisy in cool season grass fairway settings.

Maximum use rates of the reviewed products are as follows: Drive: 1.5 lbs ai/A per year, Speed Zone: 0.062 lb. of carfentrazone/A or 10 pt/A/year, Vanquish: 1.0 lb ai/A or 2 pt/A/year and Trimec Classic: 2.0 lb. of 2,4-D/A or 8 pt/A per year.

In our experience the best time of year to initiate postemergent applications for English daisy control is approximately September 15, although acceptable levels of control have also been observed with spring applications. Deploy sequential applications at four-week intervals. Additional applications may be required for more complete control.

This information is intended to be educational in nature and does not constitute a recommendation or exclusion of specific products.

These were independent and unbiased field research trials and all costs to support their completion were provided by Mark M. Mahady & Associates, Inc. of Carmel Valley, California.



English lawn daisy

Table 1
Evaluation of herbicide tank mixes for control of English lawn daisy in fairway settings. Salinas Golf and Country Club. David Hayes, Superintendent. 2004. Mahady & Assoc. Inc.

Treatments	Rate	% ELD Control	
		7/29/04	8 WAA #2
			Ranking
1) Untreated Check	*	0%	7
2) Trimec Classic + Vanquish (dicamba)	4.0 pt/A + 0.33 lb ai/A	39%	4
3) Speed Zone + Vanquish	5.0 pt/A + 0.33 lb ai/A	38%	5
4) Drive + Vanquish	0.75 lb ai.+ 0.33 lb.ai	53%	3
5) Confront + Vanquish	2.0 pt/A + 0.33 lb ai/A	21%	6
6) Trimec + Drive + Vanquish	4.0 pt + 0.75 lb ai + 0.33 lb ai/A	64%	2
7) Speed Zone + Drive + Vanquish	5.0 pt + 0.75 lb ai +0.33 lb ai/A	87%	1

On-Site Reclamation Study - Economic Viability

By Mike Huck

In past issues of the Quarterly Bulletin the SCGA's On Site Water Reclamation (OSR) feasibility study funded by the Metropolitan Water District of Southern California's Innovative Supply Program has been highlighted. The study is now 95% complete and the various participants are working together finalizing a full written report. Economic viability and energy intensity studies were both considered in the study and each produced interesting results based upon the Coronado (San Diego Area) model.

Construction & Operating Costs per Acre Foot (AF) - The annual demand of 450 AF per year was based upon irrigation of the 110 acre Coronado Municipal Golf course, a nearby 24-acre park and several acres of Cal-Tans easement.

Grants, Rebates and Credits - If the story were to end here at a final cost of \$1962 per AF (Table 1) we would typically walk away agreeing this was not economically viable in 2005. There are however, various rebates and credits to be considered beyond this unit cost alone.

From an earlier update you may recall that all sewerage was pumped off Coronado Island for treatment at the Point Loma wastewater facility owned by the city of San Diego. (Also remember the modeled Coronado plant is a "scalping plan" that will harvest 95% of the water entering it while sending the solids removed to Point Loma for treatment in approximately a 5% return flow.)

The reduction of sewerage sent to the city of San Diego directly reduces the city of Coronado's pumping & sewer treatment costs. Treatment costs are based upon volume and chemical oxygen demand (COD), standard methods in the wastewater industry to charge for treatment).

Additionally, water conservation credits are available from both the Metropolitan Water District of Southern California (MWDSC) and San Diego County Water Authority (SDCWA).

Current & Future Considerations - The current cost of potable water for irrigation purposes at Coronado Golf course is approximately \$785 AF. The \$287 AF difference for some may still appear to be too large an ongoing expense to consider development of an OSR. However, considering cost alone may be short sighted, especially in the arid southwestern United States where drought and water shortages are predicted to become more commonplace due to climate change and increasing population growth & fresh water demand.

As one example the Point Loma wastewater facility currently servicing the city of Coronado is allowed to produce & dis-

charge advanced primary treated wastewater into the Pacific Ocean under a "secondary treatment waiver" from the Federal EPA. Based upon a similar scenario in nearby Orange County, California the estimated cost increase for upgrading from primary to secondary treatment is approximately \$418 A/F. This could result in additional credits for the Coronado OSR recycled water reducing the net cost to around \$654 AF.

Wastewater regulations are becoming more stringent with TMDL (total maximum daily load) thresholds currently being set by the State Regional Water Quality Control Boards (SRWQCB). Many are set at levels that cannot be achieved even with reverse osmosis.

Finally, "economics 101" tells us potable water costs will continue to rise with demand as suggested by recently announced tiered urban irrigation water rates in the following table.

Summary - The economic viability to justify constructing an OSR plant is currently dependent upon 1) site-specific conditions, 2) the availability of grant funding, 3) water

conservation rebates, 4) the future cost of treating sewerage water for ocean or waterway disposal or 5) the cost and availability of importing fresh water.

Many see the OSR as a potential new source of fresh water conservation by offsetting current potable irrigation used with recycled water. They recognize that new sources of fresh water will be more difficult and expensive to acquire than ever before. They also know all of the above factors affecting the economics are dynamic and subject to change, change that may happen

Table 1 Total Amortized Annual Costs			
Cost Item	Total Cost	Capital Recovery Factor*	Annual Cost
OSR Implementation (Planning/Construction) Cost	\$8.96 million	0.06506	\$583,000
OSR Annual Operating Cost (Estimated at 5% of total construction cost)			\$300,000
Total Annual Cost			\$883,000
Cost per AF - 450 AF annually			\$1,962

* Assumes 30-year life/5% discount rate - From USBR Desalination and Water Purification Research and Development Report #103 (April 2004)

Table 2 Estimated Per Acre Foot Costs After Credits and Rebates	
Cost/(Credit)	\$/AF
0.4 mgd OSR at Coronado	\$1,962
Wastewater Volume Credit	(\$420)
Wastewater COD Credit	(\$120)
Wastewater Suspended Solids Credit	\$0
MWDSC Water Conservation Credit	(\$250)
SDCWA Water Conservation Credit	(\$100)
Net Cost Per AF	\$1,072

New Product Outlook for California Turf

By Wendy Gelernter, Ph.D. and Larry Stowell, Ph.D., PACE Turfgrass Research Institute

"The good thing about the slow rate of California product registrations", the optimists among us like to say, "is that it allows us to benefit from other superintendent's trials and tribulations with new products, which allows us to avoid their mistakes." And it is true that in many cases, the kinks in timing, rates and application procedures are ironed out by superintendents in other states by the time the products are finally registered here. That's the upside of our sometimes grindingly slow regulatory process. We'll leave discussion of the downsides for another time.

We expect to see one of the "upsides" soon, when the new transition-accelerating product Revolver is registered in California. The product, a selective post-emergence herbicide, was posted at the end of February and should be available for California sales by April 1, 2005. The product, which controls volunteer ryegrass, Poa annua, goosegrass and other annual and perennial grasses from warm season fairways. The Bayer Environmental Science product, a sulfonurea herbicide, has been available in most other states since 2003, (other similar products include Monument, Manor and TranXit) that are useful tools in accelerating the spring transition on overseeded fairways.

Some more good news for turfgrass managers trying to control Poa annua invasion and competition. Trimmit 2SC (paclobutrazol) is proposed to register in California and come off posting on May 3rd. Trimmit, a product of Syngenta, is a plant growth regulator that suppresses the growth and development of Poa annua in mixed turfgrass stands including bentgrass putting greens. Poa annua is very sensitive to Trimmit and its ability to compete in a mixed population is severely reduced after application. It also kills Poa annua seedlings. Trimmit can be used on all major turfgrass species for growth suppression and control of Poa annua and on overseeded bermudagrass (including greens) for Poa annua control and color enhancement of the overseeding.

Superintendents and researchers around the country have been testing these products for the past few years, and many of the key use pattern issues have been resolved. For more information on the use of transition accelerating products, with a special emphasis on southwestern climate and timing issues, see our 2-part article in the March, 2005 Golf Course Management entitled: "Improved Overseeding Programs: Managing the Spring Transition."

There are several other potentially useful products that are not registered in California yet, but that we think are worth while keeping your eyes out for:

- o Velocity herbicide (Valent): controls Poa annua in cool-season and overseeded turf

- o Lynx fungicide (Bayer): this product is not even registered by the EPA yet, so there may be a longer wait before we see it here. However, Lynx, which PACE has tested for a number of years on California golf courses, has some unique properties which may make it a valuable tool for use in California - particularly its ability to selectively remove Poa annua from bentgrass greens without damaging the bentgrass. Lynx is also an effective sterol synthesis inhibitor fungicide with activity against a broad spectrum of turf diseases.

- o Monument (Syngenta): in the same class of products as Revolver, Monument has also shown good efficacy as a transition accelerator, as well as for control of sedges.

- o Heritage TL fungicide (Syngenta): The new liquid "TL" formulation of Heritage will be a bit easier to handle than the current granular formulation, and is purported to be taken up more rapidly by the plant.

Finally, we want to encourage everyone to visit the upgraded PACE website at www.paceturf.org. The website is an advertising-free public service provided by the PACE Turfgrass Research Institute. Of particular interest is our large photo gallery of turfgrass management photos that are available to anyone using them for non-profit or educational purposes. Participants who wish to share their photos with others in the turf community are able to upload their images onto this site. In addition, a large archive of turf research articles resides in Super Journal, PACE's on-line turf research journal where both superintendents and researchers are encouraged to report their experimental results.

The Big Show

By Kevin P. Breen

Rarely does an event live up to the hype and rumor generated leading up to actual execution of the spectacle that has been forecasted. Such was the case with the Golf Industry Show in Orlando. This was, is and most likely always will be the "Superintendents Show", despite all the predictions that the new show was going to be something other than what it was in the past. It is very difficult to change the dynamic of the show when over 90% of the attendees are members of the GCSAA. Until the members of the allied associations that take part in the show have numbers to rival the GCSAA, or they spend more dollars than the golf maintenance industry at the show, the vendors and the trade show will continue to be the "Superintendents Show", despite any name change to the annual event.

There were some things that were different from previous shows that were really quite superficial. The indoor practice center seemed a little out of place, with artificial turf and guys working on their golf game with ties on, which did function for many as an opportunity for comic relief, meaning it may return at future events. On the other hand the presentations at the Solution Centers had good speakers and good topics but were poorly attended. Good idea was the buzz among attendees concerning the Solution Centers, however they did not seem to be utilized.

New equipment and technology was present and as always and was met appropriately with some skepticism. The Segway personal transporter generated a lot of talk but I don't know one person who was going to make a purchase or would like to see one on their golf course. GPS was everywhere. It seems we can no longer live happily in our world without it, despite the fact that most superintendents don't have it today. Signs that we may be going too far were blaring when National introduced a rotary trim mower and Jacobson introduced a disposable bed knife that cuts at .064 inches. Do we really want to go there? Phosphoric acid and bugs in jugs were hot topics and everyone had their version and some research to back up why theirs was the best. They can't all be the best.

Overall, the new innovations mirrored those of years past. Yes, there are improvements, but we are not dealing with rocket science, rather with an industry that has more to do with the art of growing a plant and human relations. What the show is fundamentally about is the relationships and discussions between attendees. It was the "Superintendents Show", once again, were the conversation between superintendents was likely to be covering seasonal staffing and mother nature rather than the latest way to cut grass.

The Pathologist's Corner

By Frank P. Wong
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Spring Practices to Get Ready for Summertime Diseases

Spring time is in the air! With the longer days, flowers and sunshine also comes some negatives, like hay fever, argentine ant invasions in the kitchen and federal taxes. Speaking of tax time, getting ready for summer diseases on annual bluegrass greens is kind of like doing your taxes. If you spend the time getting all of your receipts and paperwork in order over the year and have everything filed away neatly, it's a breeze to fill out those 1040s, 540s and 2441 forms. Wait until the very last minute to start (like a certain plant pathologist from the University of California) and you're in for a rough time. Getting ready summer diseases now works the same way - doing something now is going to make life much easier come July and August when it's crunch time.

Keep in mind the following in your spring program to help you get through the summer in one piece

Nitrogen Fertility - Everyone knows that anthracnose tends to be more severe on weak turf. A two year study recently performed at Rutgers University by Dr. Bruce Clarke (<http://turf.rutgers.edu/extensionand-outreach/aas2004.pdf>) showed a 25 to 65% reduction in anthracnose on an annual bluegrass green treated with 3 lbs of N per 1000 sq ft (0.1 lb N per 1000 sq ft at ~7 day intervals) compared to 1.5 lbs of N per 1000 sq ft (0.1 lb N per 1000 sq ft at ~28 days).

In separate experiments, the addition of 0.125 lb N per 1000 sq ft every 14 days to fungicide sprays reduced anthracnose severity by 18 to 36% vs. fungicides used alone.

As spring temperatures rise, annual bluegrass will grow actively and demand more nitrogen, which can deplete

nitrogen stores that it needs in the summer, so fertilize adequately at this time to prevent annual bluegrass from going into N-deficient. Shoot for 3 to 4 lbs of N per 1000 sq ft over the year and it will pay off by having higher vigor turf more resistant to anthracnose and other summer stresses.

Core Aerification - Skipping spring aerification can lead to big problems in the summer. Compaction of greens leads to poor rooting, turf thinning and reduced water infiltration, which can all result in added stress on annual bluegrass in the summer. Core aerification will also help remove organic matter and thatch and prevent soil layering problems. Skipping it in the spring is likely going to leave you with greens that are going to seal up leading to problems with anthracnose (compaction, poor rooting) or rapid blight (no infiltration of water to leach through greens).

Plant Growth Regulators - In the spring, annual bluegrass is primed to grow like gangbusters. Use seedhead-suppressing chemicals such as Proxy or Embark to prevent plants from expending energy to flower and seed. Use regular Primo applications to keep plants tight and compact to maintain fast playing surfaces without resorting to ultra-low mowing heights which removes too much leaf area to allow plants to produce sufficient carbohydrates from photosynthesis.

Preventative Fungicide Treatments - 65 to 68°F is the magic soil temperature to initiate preventative fungicide applications for summer patch and anthracnose. Start spraying when soil temperatures warm up consistently into and past this range. Early season applications should focus on SI-fungicides. Daconil, Endorse, Medallion and Signature are all good choices for anthracnose control when the weather gets hot, while Heritage and Insignia should be used once a month if you have summer patch problems. Keep Insignia or Compass and Fore handy if you have had rapid blight. Some of our fungicide trial results from last summer's work with Troy Flanagan at Round Hill Country Club are posted on the web at <http://www.ncga.org/turf/anthracnose.htm>.

Fertilize, Aerify, Regulate and Treat this spring, and you will be ahead of the game for summer disease control. Until then, good luck and keep an eye out for those diseases!



Proper spring time practices can help you prevent your greens from looking like this in the summer.