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TIMELY TURF ADVICE

TURF SCHOOL STUDY

A Dim Future for University Turfgrass Research

BY CLARK THROSSELL, PH.D.

These are tough times for the golf industry, including university turfgrass research programs. The reason is a lack of funding. It certainly isn't a lack of problems to solve. Funding for turfgrass research is hard to find today and will be harder to find tomorrow. The end result will be less turfgrass research, fewer university turfgrass scientists and less expertise to support superintendents.

Let's start with a review of the funding realities at a public university. States budget money to universities. That money goes to salaries and benefits of professors, administrators and some staff members and basic operations. Professors must secure funding for their research programs, including salaries and benefits for technicians to maintain turf plots or run a lab, salaries, benefits and tuition for graduate students to conduct research, turfgrass plot maintenance, equipment, travel and all the other things that are necessary for a successful research program.

These expenses add up quickly and it is a challenge to secure funding year after year to keep a productive research program running. And in case you are wondering, all professors, not just turfgrass scientists, are required to generate funding to support their research program.

Add to this the dismal financial condition of many states. Additional budget cuts at already stressed public universities are likely. This will impact all university activities including turfgrass research programs. In short, public funding for turfgrass research is not going to happen.

Another reality of university life for all professors, including turfgrass scientists, is they are expected to secure funding from sources outside the state budget. If funding can't be secured for turfgrass research, turfgrass scientists will look to other research areas to apply their knowledge and compete for funding with a net result of a loss of expertise to superintendents.

> "The end result will be less turfgrass research, fewer university turfgrass scientists and less expertise to support superintendents."

Funding for turfgrass research is drying up. Traditionally, turf foundations provided generous support to universities for turfgrass research. In many cases, this is not true today. In the last 10 years or so, turf foundations have struggled financially and as a result the amount donated for university turfgrass research has stayed flat or declined.

The USGA has been the driving force funding turfgrass research. Since the late 1980s, the USGA has provided funding for a wide array of research projects that have yielded numerous advancements that are used daily on golf courses across the country and around the world. Unfortunately, the USGA has had to reduce research funding in the last few years. GCSAA and NTEP also fund turfgrass research and both organizations have had to reduce their research funding over the last few years. Given the tough economic times and stagnation in the golf industry, it is unlikely that increases in research funding will be forthcoming from golf or turf organizations.

University turfgrass research funding is not likely to grow in the future unless the golf course superintendents step up and change the current direction of research funding. Superintendents enjoy a rich legacy of creating and supporting university turf programs. It is time to reinvigorate this legacy.

What can you do? Be seen and be heard. Attend the field day and turf conference sponsored by your state turf program every year and take along a couple of your staff members. Tell the department head and dean how important the turfgrass research program is to your golf course and your career success. Talk to your colleagues in the Carolinas and start your version of Rounds for Research. Personally donate to the turfgrass program in your state. Most of all, talk to your fellow superintendents to raise awareness of the research funding crunch and take action to increase funding for turfgrass research. ■

Clark Throssell, Ph.D., contributing editor for *Golfdom* and a turfgrass scientist, can be reached at clarkthrossell@bresnan.net.

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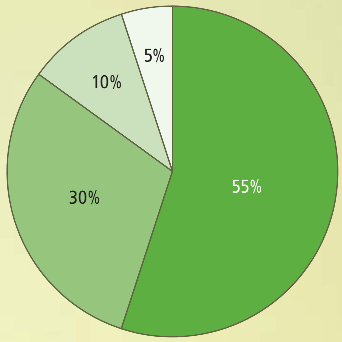

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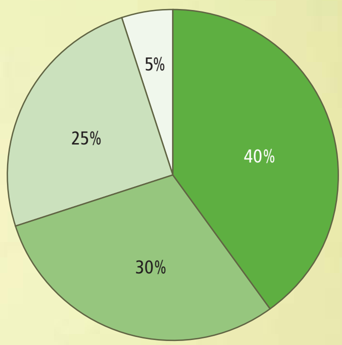

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Golfdom'S PRACTICAL RESEARCH DIGEST FOR TURF MANAGERS

TURFGRASS TRENDS

SNOW MOLD AND GOLF TURF

Organic and Biologically Amended Fertilizers

PART 1 Can using these materials reduce snow mold damage on golf turf?

By Adam Van Dyke

Superintendents are inundated with commercial products containing organic sources of nutrients and biological organisms for managing turf. Beyond the "good feelings" described by Zontek et al. as reasons turf managers use "natural" or "organic" products, incorporating these types of materials into golf management practices may be a way to reduce synthetic inputs and consequently provide other benefits to turfgrass systems.

Potential benefits of using organic and biological materials may include improving soil structure and increasing beneficial microbes.

Snow molds (gray, *Typhula spp.*; and pink, *Microdochium nivale*) can occur annually in the Intermountain West and devastate golf turf if not treated with synthetic fungicides. One fungicide used to control these diseases, pentachloronitrobenzene (PCNB), was under federal review in 2008 and was the subject of a federal stop-sale, lifted in August 2011.

Given the uncertainty over future uses of PCNB in turf and an industry movement toward more sustainable management, alternatives to fungicides for snow mold control must be studied. This study tested commercially available organic and biologically amended fertilizers in the field under golf course conditions. The objective was to determine if these products can reduce snow mold damage of highly maintained golf turf.

Materials and methods

The experiment was conducted from 2009 to 2011 on a fairway at Willow Creek Country Club in Sandy, Utah using three replicate 6-foot by 10-foot plots.

The fairway was a mixture of perennial ryegrass (*Lolium perenne* L.) and creeping bentgrass (*Agrostis palustris* Huds.) mowed three times a week at 0.75 inches. Permanent snow cover begins around late-November or December and normally lasts more than 90 days. However, snow cover lasted less than 60 days the first winter (2010) and no snow mold damage occurred. Year 1 of the experiment was repeated at Glenwild Golf Club in Park City, Utah in 2010 — the same time Year 2 was being conducted

Continued on page 36

This is the first of a two-part series evaluating organic and biologically amended fertilizers on actual golf courses. In a later issue of *Turfgrass Trends*, the author will report more from this study about the influence of these organics and biologicals on turfgrass quality and chlorophyll content over two years compared to some synthetic fertilizers.

IN THIS ISSUE

OUR SPONSORS

Continued from page 35

at Willow Creek — to recover snow mold data after one growing season. The repeat of Year 1 was conducted on Kentucky bluegrass (*Poa pratensis* L.) rough mowed at 1.5 inches two times each week using three replicate 5-foot by 5-foot plots. Neither test area was treated with fungicides nor additional fertilizers.

Two granular organic fertilizers and two biologically amended soil inoculants containing nutrients were applied in season-long programs for two years and evaluated against a synthetic fertilizer control and a PCNB fungicide check. The synthetic fertilizers are listed in Table 1. The fungicide check treatment consisted of Turfcide 10G, a.i. 10% PCNB (Chemtura Corporation) applied once prior to snow cover. The organic fertilizers included a 5-2-4 material (Sustane Natural Fertilizers) and an experimental material "PTS1 organic" (analysis and company confidential). Biological materials included TurfPro liquid 0.5-0.2-0 (Organic Products Company) and Growth XL 16-4-8 (3 Tier Technologies).

Programs for snow mold control were determined by manufacturers' recommendations. Organic fertilizers were applied by hand every 60 days at 0.75 pounds of nitrogen (N) per 1,000 square feet from May to November each year. Synthetic fertilizers were applied at the same rate of N to normalize the treatments, but differences in other nutrients did occur.

Biologically amended treatments were foliar applied with a pressurized backpack sprayer from May to November in each year. TurfPro liquid was applied every 14 days at 6 fluid ounces per 1,000 square feet the first year, and at 30-day intervals at the same rate the second year. TurfPro dry (1.8-0-0.1) was also applied to these plots at 10 pounds per 1,000 square feet prior to snow cover each year (Table 1). Growth XL was applied every 30 days at 3 fluid ounces per 1,000 square feet the first year, and 6 fluid ounces per 1,000 square feet at 30-day intervals the second year. Growth XL and TurfPro materials provided some nutrition to the turf but needed to be supplemented with additional fertilizers. Granular fertilizers used in the synthetic control treatment were applied at half the rate of N (Table 1).

Snow mold damage was

TABLE 1: COMMERCIAL FERTILIZERS

TREATMENT	PRODUCT(S)	RATE (per 1000ft^2)	SCHEDULE (beginning in May)
Synthetic control	Utah's Finest™ 23-3-16	0.75 lbs nitrogen (N)	Every 60 days
	Utah's Finest™ 20-4-20	0.75 lbs N (in 2009) 1 lb N (in 2010)	Once in late-fall
PCNB check	Turfcide 10G	10 lbs product (10% A.I.)	Once prior to snow cover
	Utah's Finest™ 23-3-16	0.75 lbs N	Every 60 days
	Utah's Finest™ 20-4-20	0.75 lbs N (in 2009) 1 lb N (in 2010)	Once in late-fall
PTS1 organic	Confidential	0.75 lbs N (1 lb N in late-fall 2010)	Every 60 days
5-2-4 organic	Sustane™ 5-2-4	0.75 lbs N (1 lb N in late-fall 2010)	Every 60 days
Turf Pro biological	Turf Pro™ liquid	6 fl oz product	Every 14 days in 2009, Every 30 days in 2010
	Turf Pro™ dry	10 lbs product	Once prior to snow cover
	Utah's Finest™ 23-3-16	0.75 lbs N	Every 60 days
	Utah's Finest™ 20-4-20	0.75 lbs N (in 2009) 1 lb N (in 2010)	Once in late-fall
Growth XL biological	Growth XL	3 fl oz product (in 2009) 6 fl oz product (in 2010)	Every 30 days
	Utah's Finest™ 23-3-16	0.38 lbs N	Every 60 days
	Utah's Finest™ 20-4-20	0.38 lbs N (in 2009) 1 lb N (in 2010)	Once in late-fall

TABLE 2: SNOW MOLD CONTROL

TREATMENT		YEAR 1		YEAR 2		
		Glenwild location		Willow Creek location		
		Damage[w] 5-5-11	Disease reduction[x]	Damage 2-16-11	Disease reduction	Centers[y] 2-16-11
		%	%	%	%	%
Synthetic control		81.7 a[z]	---	24.5 a	---	37.4 a
PCNB check		3.3 d	96	0.4 b	98	0.7 b
PTS1 organic		60.0 abc	27	20.0 a	18	31.0 a
5-2-4 organic		40.0 c	51	14.2 a	42	17.4 a
Turf Pro biological		53.3 bc	35	45.9 a	0	34.5 a
Growth XL biological		71.7 ab	12	40.0 a	0	44.0 a
ANOVA						
Effect	df					
Treatment	6	***	---	*	---	*

[v] *Granular fertilizers (synthetic and organic) were applied every 60 days at 0.75 pounds of nitrogen per 1000 sq. ft. for two growing seasons (Year 1, Year 2). Turf Pro biological was foliar applied at 6 fl oz per 1000 sq. ft. at 14 day intervals the first year, and 30 day intervals the second year. Growth XL biological was foliar applied at 3 fl oz (Year 1) and 6 fl oz (Year 2) per 1000 sq. ft. on 30 day intervals.*

[w] *Snow mold damage rating scale 0-100%, where 100= entire plot damaged.*

[x] *Determined as a percentage of synthetic control plots with >70% having effective suppression (Nelson and Craft, 1992a).*

[y] *Mean number of spots per three replicate 60 sq. ft. plot.*

[z] *Means within same column with same letter are not different significantly P=0.05.*

, **, *, ns, significant at P≤0.05, 0.01, 0.001, or not significant respectively.*

visually assessed after snow melt at each location on a 0 to 100% scale, with 100% having complete damage and analyzed for differences. Gray snow mold infection centers were also counted at the Willow Creek location in 2011 and analyzed for differences. Reductions in disease severity were determined as a percentage of the synthetic control, with effective suppression being greater than 70% reduction as explained in Nelson and Craft.

Snow mold control

None of the organic or biologically amended fertilizers tested in this experiment adequately controlled snow mold (<10% affected area, Hsiang and Cook, 2001) or had acceptable suppression (greater than 70% disease reduction, Nelson and Craft, 1992a) in both years (Table 2).

PCNB provided the best statistical control in both years, reducing damage 96% in Year 1 at the Glenwild location and 98% in Year 2 at the Willow Creek location.

Applications of 5-2-4 organic fertilizer and TurfPro biological materials appeared to reduce snow mold damage to Kentucky bluegrass compared to applying synthetic fertilizers alone after one year.

These materials are not registered fungicides and did not provide acceptable control of gray snow mold (Hsiang and Cook, 2001) — while applications of PCNB did. Furthermore, statistical reductions in snow mold damage were not observed after a second year of applying these materials. The lack of consistent results indicates a need for further studies.

The use of organic sources of nutrients and/or biologically amended materials may not replace the need for fungicides, but perhaps incorporating them into management practices may be a way to reduce the rates of fungicides.

Adam Van Dyke, M.S., is owner and president of Professional Turfgrass Solutions, LLC. He specializes in conducting scientific studies and consulting for the golf industry. He can be reached at adam@proturfgrass-solutions.com.

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Converting Existing Putting Greens Through Interseeding

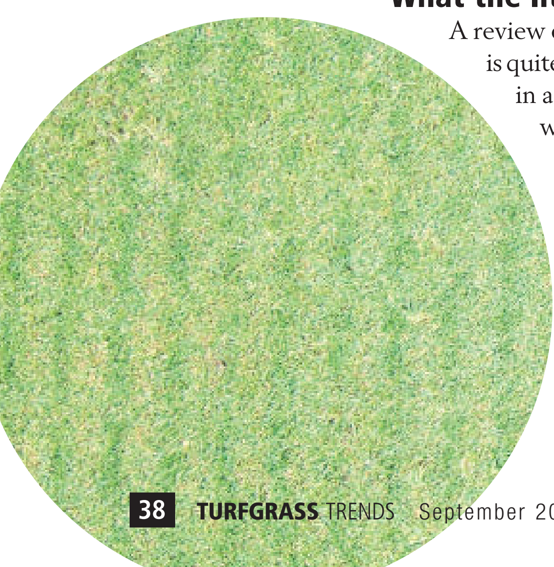
By Marcus A. Jones and Nick E. Christians

Managing annual bluegrass (*Poa annua*) during periods of high environmental stress can be challenging to say the least. I learned how difficult it can be during my time as an assistant golf course superintendent. Our putting greens, with a mixture of Penncross and Washington bentgrasses, had long ago given way to annual bluegrass, a common problem at many long-established facilities. Fairways and tees also had considerable amounts of *Poa*.

In the turf industry *Poa* is a fact of life, an inevitable invader of intensely managed landscapes. While *Poa* can provide an acceptable playing surface, we were committed to extensive chemical inputs to maintain quality conditions and our approach was becoming unsustainable given our shrinking budget.

We needed to renovate our playing surfaces and were anxious to utilize the newest bentgrass cultivars with their improved agronomic characteristics and increased competitiveness against *Poa*. The only problem was we couldn't afford the stoppage of play that accompanies a traditional renovation.

In the end, we were stuck trying to manage our existing playing surfaces. When I decided to return to school for my doctorate, deciding on a research project was easy: renovating existing putting greens through interseeding.



A vigorous renovation plot in the fall. One clearly can see the seedlings emerging through the canopy.

PHOTO COURTESY: MARCUS JONES

What the literature says

A review of the interseeding literature is quite divided. Many people within academia have experimented with interseeding and their results are all but unanimous: Interseeding doesn't work. Yet many researchers from industry and turfgrass practitioners contend to find value in the practice.

Those who have had marginal success often have to disrupt the playing surface to the extent that quality and uniformity are severely compromised. The difficulty of establishing new cultivars is often credited to the inability of the seedlings to compete with mature plants for soil moisture and nutrients. However, a study conducted by Rutgers University provided a small glimmer of hope.

The Rutgers study investigated the effects of seeding date and interseeding cultivar on the establishment of creeping bentgrass into an annual bluegrass putting green. The results of their work suggested mid-summer seeding dates resulted in the greatest conversion and that recently released cultivars of creeping bentgrass are better suited for interseeding compared with traditional cultivars such as Penncross.

Our approach to interseeding

We first evaluated a number of creeping bentgrass cultivars to identify which was the most aggressive from a germination standpoint. Knowing that the seedling would be faced with competition from the existing turf, it was important that we selected a bentgrass cultivar of high vigor. Based on our results, we chose Penn A-4 as our interseeding species.

A second strategy was to attempt to create a soil seedbank of creeping bentgrass. Research suggests that creeping bentgrass can remain viable in the soil years after being planted. A large soil seed bank is one reason why *Poa* is so successful at colonizing established putting greens. Borrowing this concept, we utilized multiple interseeding events throughout the season using a Maredo spiker/seeder. Interseeding was performed either two or nine times to supply yearly totals of 4.5 or 13.5 pounds per 1,000 square feet Penn A-4.

We also used generous seeding rates (1.5 pounds per 1,000 square feet) each time we interseeded in order to account for the high mortality rates expected from traffic and plant competition.

FIGURE 1: CONVERSION

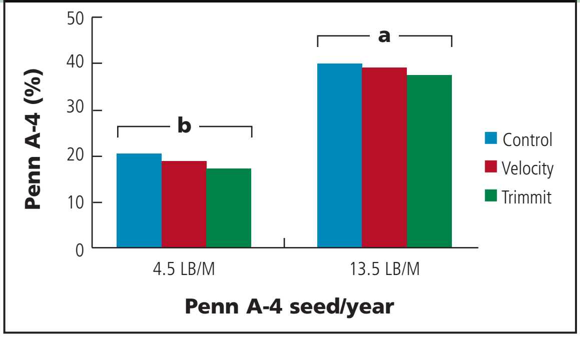
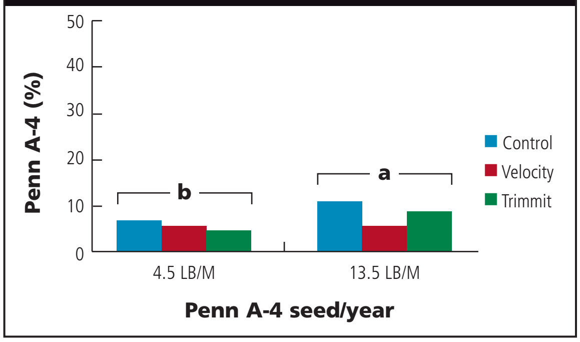


FIGURE 2: PENN A-4 POPULATIONS



Finally, we incorporated Trimmit growth regulator and Velocity herbicide into the trial. The hope was that we could reduce the competition from the existing turf with the use of these products. Velocity applications started the first week of June and were applied at two ounces per acre every 14 days for a total of four applications. A fifth and final application of Velocity was made October 1. Trimmit applications also started June 4 and were applied at 6 ounces per acre every 14 days for a total of eight applications.

The interseeding trial was conducted at a local golf course on their practice putting green and on a research green at the Iowa State University Horticulture Research Station. Regular maintenance practices were only slightly altered as the goal was to preserve conditions that would allow play.

Mowing was performed daily to a height of 0.125 inches and overhead irrigation was applied as necessary. Fertilizer (7N-7P-7K) was applied at a rate of 0.25 pounds N per 1,000 square feet each month of the growing season and diseases and insects were controlled as necessary.

Does it work?

The 4.5 and 13.5 pounds per 1,000 square feet seeding regimes resulted in a 19% and 39% conversion to Penn A-4, respectively, on the golf course putting green the fall after interseeding (Figure 1).

Penn A-4 populations were reduced to 1% and 8% the next spring (Figure 2).

These data indicate a transient shift to Penn A-4 occurred but was not able to persist.

Furthermore, applications of Trimmit or Velocity did not hasten conversion to Penn A-4 (Figures 1 and 2). The percentage of annual bluegrass was reduced from approximately 60% to 20% in plots treated with Velocity during the first year of the study. However, significant loss of density was observed during the second year of the study from Velocity applications.

Conversion was more persistent on the research putting green. The 13.5 pounds per 1,000 square feet seeding regime resulted in a 42% establishment of Penn A-4 the fall following interseeding. Evaluation of the plots the following spring revealed 45% Penn A-4 still present. Although interseeding was more successful in the research setting, the overall quality of the turf would not be acceptable for most putting greens.

These results suggest that the level of maintenance and overall quality of the putting surface influence the success of conversion. Conversion through interseeding in this study was unsuccessful when the plots were maintained under golf course conditions. Interseeding was only successful when conditions were allowed to deteriorate below acceptable levels. The overall conditioning of the putting surface in order to permit interseeding needs to be weighed against the cost of a traditional conversion when deciding on a renovation program.

Marcus A. Jones is a graduate research assistant and Nick E. Christians is a professor of turfgrass at Iowa State University. Reach Jones at marcusajones@gmail.com.

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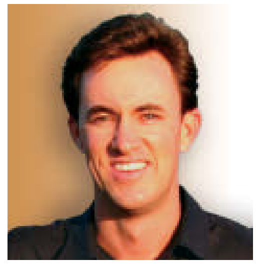

BY GEOFF SHACKELFORD

Nobody made me Dean of Turf School. But if they did, here's my roster of must-have courses for the curriculum.

Introduction To Golf, 101 – *Circa 1450 To November 27, 2009 B.F.H. (Before Fire Hydrant)* – This comprehensive review will take us from the earliest days of Mary Queen of Scots whapping it around the first golf courses, to the Old Course's evolution under the watchful eye of the game's first superintendent and architect: Old Tom Morris. We'll zoom through the Jones, Hogan, Palmer and Nicklaus eras and finish with Tiger Woods' fateful left turn out of his driveway and into a fire hydrant.

Golf In The Post-Tiger Era, 201 – *November 28, 2009 A.F.H. (After Fire Hydrant) to the Present* – Featuring police images, witness accounts and a full rundown of the Taiwanese reenactment videos, this course will commence with a detailed reconstruction of the minor car accident that commenced the modern era of the game. The class will feature a thorough review of each of Tiger's major swing changes and engage in state-of-the-game discussions focusing on ways superintendents can improve the future by reducing costs, improving efficiency and maintaining their unique role as keepers of the green.

Introduction to Golfers, 101 – *Understanding Their Neurotic Tendencies, Strange Peccadillos and General Lack of Interest in Your Opinion* – For all of the claims that golfers are the most humble of recreational and professional athletes, this course will quickly set you straight. Guest speakers will share stories of how to deal with those who, seemingly successful in life, can allow the pettiest misfortune to ruin their round and demand that they could do your job better than you. The course will be topped off by a celebratory beating of a piñata dressed in shorts, ankle socks and a logoed golf shirt.

Golfers As Your Boss, 201 – *Dealing With Boards, Committee Members, General Managers, PGA Professionals and Green Chairmen* – This dynamic class will prepare the student by teaching responses designed to help expedite painful conversations ("That's not the worst idea I've ever heard"), all with the goal of never putting you, the superintendent, on the record saying something that could later lead to termination. Clips from Caddyshack will be screened to prevent morbid depression from setting in.

Introduction To Golf Architecture, 101 – Since an alarming number of remodels, redesigns and overall changes to courses lead to hair loss, back pain, hemorrhoidal swelling and even job loss, this introductory class is designed to teach the basics of golf architecture while instilling just enough knowledge to give you a better architectural sense than many practicing designers. The various schools of design (strategic, penal, confusing) will be discussed. In the interest of future job security, students will be encouraged to flesh out any of their desires to play architect later in life. Paper and pencil will be provided.

Player Architects And Other Low Points in Golf Design History, 201 – From the days when Old Tom Morris fended off charges from Allan Robertson that he redesigned the Old Course to fit his game, to modern day accusations of Jack Nicklaus designing any number of courses for his high fade, we'll study the many oddball moments in the history of design to better prepare students for their inevitable first meetings with visiting architects. We'll discuss what was going through Nicklaus's mind during his chocolate drop phase, the deeper meaning of Desmond Muirhead's mermaid island green, and the fire hazard risks associated with any Pete Dye course built during his railroad tie phase. Students should be prepared to memorize terminology that will make them sound intelligent and well informed when talking to architects and golfers alike. Because in this world, it's better to sound intelligent than to be intelligent.

Reach Shack, Golfdom's contributing editor, at geoffshack@me.com. Check out his blog – now a part of the Golf Digest family – at www.geoffshackelford.com.