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The official publication of the MGCSA

Monarchs in the Rough: Golf Courses Helping an Iconic Species



Vol. 49, No. 5 June, 2015



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Presidential Perspective

by Jake Schmitz, Superintendent at Olympic Hills Golf Club

Just about every day in the news, one can almost always read about

generational issues. Very few people remain from the greatest generation, as father time has run out on many from this great genre. The baby boomers are retiring, which has the threat of creating a vast labor vacuum for the trades, and the Gen X'ers are causing many to scratch their heads wondering just exactly how these people will impact the future productivity of our great nation. Oftentimes, many of these stories are found in the business section of the newspaper, simply because it gives the economists one more thing to worry about, thus forcing the stock market into wild gyrations. Generational issues create interest and make for good reading, but I often wonder

just how many times history has repeated itself regarding the behavior of generations.

History definitely has a way of repeating itself, and the maintenance aspect of the golf industry is not immune to this fact. Triplexing, walk mowing, core aeration, rolling and numerous other maintenance activities have been tried once, put on the shelf, and resurrected as the next greatest idea.

Seasoned veterans will often roll their eyes at the young bucks who think they are the smartest chap in town, simply because these go-getters brought something back that the old-timers used when they first started in the business.

Yet, there is an issue in the industry that continues to evolve, and I am curious as to how the previous generations dealt with it.



More importantly, I am curious to see how golf will respond and react to the ever-more challenging issue of labor for golf course maintenance.

There has been a great deal of chatter in 2015 regarding the recruitment and retention of quality employees for golf course maintenance. Club superintendents are finding it very difficult to find employees that will start out in the business like many of us did, where we started at minimum wage and moved up the ranks with meager increases along the way.

Today, we are learning that many folks simply do not want to work that hard for \$9.50 an hour. When Burger King is advertising for \$10.50 as a starting wage, how attractive do we look when we ask people to wake up at 4:30am, work their tails off until 2pm, and then do it all over again? There is a shift beginning to take place

where clubs are being forced to pay more money for seasonal employees, with the idea of higher wages leading to high quality employees with less attrition. Seems like a pretty good recipe to me, but what impact will this have on the game of golf?

With labor typically comprising anywhere from 55-70% of a maintenance budget, rising hourly rates will most certainly have an impact on greens fees and member dues. Sadly, the courses that take it in the shorts are the mom and pop venues where many young people are first introduced to the game. With golf course closures forecast for another 150-165 facilities in 2015, reality sets in when the community course just can't make it anymore and the doors are closed.

Analysts say that this correction is needed to make the industry healthy once again; but one has to question the validity of that

analysis. If the affordable courses are shutting down because overhead is too high, how does that benefit the ‘nicer’ venues for the long term?

To me, it almost appears that the real issue with golf is the expensive clubs that continue to drive up maintenance budgets in that endless pursuit of perfection. These clubs can afford the higher labor rates, much like a club in the desert that can continue to pay more and more for water usage each year. Many large budget operations are immune to increases in overhead, simply because they can afford it. But what kind of impact will this have on the game 25 years down the road if the affordable courses continue to close and fewer people get introduced to the game?

I guess what this all comes down to for me personally is a longing and a desire for history to repeat itself. Take me back

to the days where fine courses were managed with less than 10 highly qualified individuals who had a vested interest in the golf course. Reintroduce me to the times where golf courses were maintained in a more natural state rather than the nuclear green, highly irrigated tracks that we frequent today. Return me to the time when kids would hang out at the local muni and play golf all day long because they could afford it. Interestingly enough, it sounds like all I would need to do is take a trip across the big pond and visit some courses in Europe to experience this type of nirvana.

Maybe someday the golf industry in America will wake up and realize that there is a successful model that dates back hundreds of years. Until that time comes, it seems that American golf will continue to ‘correct’ itself with the closure of the very places that are needed to introduce new players to the game.



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In Bounds

by Jack MacKenzie, CGCS

At one time, in my formable teenage years, a close friend, much my senior, told me to look at your gal pal's mother for a preview as to what your sweetheart's physical aspects would be when she grows up. "If you like what you see in her mother, you can expect those attributes when she reaches that age," he guided me. I can honestly say that both my spouses, previous and current, did grow to be their mother's clone, or pretty darn close.

"This holds true to your father," he continued, "for you will emulate him in physical form as well." Again my friend spoke the truth as I chanced upon my father's bare torso when he was 54 and I was a still youthful 22. I recall I was shocked at what I saw... he was an old man.

Now I am 55 and again I reflect upon my friend's wisdom and look into the future. In recent months I caught a

glimpse of my now 87-year old father in the full monty. Wow, talk about an impression. We are both growing older and feel the effects of gravity, good food and hard work. However, I am determined to look better as a late octogenarian than he.

My diet has changed, I have begun a solid exercise program and considered all that I can do to make the next 25 years of my life "quality time" as I fully appreciate that after 80 years of age, all bets are off. My youthful proclivities can certainly be held against me, yet I hope that over the next three decades I can redeem myself.

Mike Kelly's article on skin cancer in the May issue of Hole Notes struck a chord, as one of the many things I did wrong in my teens and twenties and likely thirties was skip the sun block. My bad, as I have endured two face peels to remove cancerous and precancerous cells from my face, the first a very painful experience as the chemistry was, at the time, an

experimental use product and I the guinea pig. I am due for another total body examination in search for more cancer. Have you done anything about your exposure to the sun? Do you use sun block? When did you have a skin exam? What about your staff, do you provide sun protection?

What is that you said? Oh yes, all those years of operating loud equipment without ear protection has also impacted my hearing. My mother would have said it was the music played at high volume that caused the tinnitus in my right ear, a distracting ring that, when I think about it, does impact my ability to hear clearly and on occasion is quite bothersome. Come on, in the 1970's, 80's and 90's only nerds wore hearing protection, right? What about in your shop, do you supply your youthful employees with sponge plugs? Do you lead by example and don muffs when you fire up the chain saw or demonstrate how to line trim?

Anyone ever get a wood chip in your eye or worse yet, a metal grinding? I did when drilling an experimental

tool made from a bed knife while using the drill press. Fortunately for me we had a magnetic pen for just such emergencies. But where were my goggles? What was I thinking? And how many times did I get grass clippings, wood chips and just plain dirt tossed in my face? Any one of those projectiles could have meant a sightless eye. As I used to tell my employees during my later years while a superintendent, "Chicks like guys with two eyes."

The gals (and guys too) also like their babes to have every digit that they were born with as well as functionality of those parts. Considering the many, many hours I employed sharp and fast moving tools in my job, without any protection, I am surprised that the only close call was a near miss with a chain saw. The same cannot be said of two individuals I know personally who took a live chain to the face. Sure they survived, but they never looked the same, nor looked the same, if you know what I mean. Are you and your team geared up accordingly?

As a kid I would come home painted

in blue from spraying chemistry, including colorants, in nothing but a pair of shorts. Tyvek, face shields and long sleeves were disregarded, as they could have interfered with my burn, I mean my tan. Gosh, I used to syphon more than gas back then, and maybe that is my excuse for the way that I am. Yet I am sure that this story of unprotected spraying continues to be common, perhaps not in a pair of cut-off shorts and bare feet, but you get the picture.

These are but a few precautionary tales of the “what ifs” associated with working at a golf course. How about the countless others; reckless driving, burning out ground hornet hives with gasoline, operating equipment beyond their intended use parameters, working in front of golfers with no head protection (I had an employee get beamed on the driving range smack in the middle of his forehead), heavy lifting and just plain not thinking. Are you ready for the unthinkable? What is in your first aid kit? Is there an emergency access plan for your golf course should an ambulance be necessary? Are you and your key employees trained in first aid?

I consider myself darn lucky to have sustained only minor issues associated with working in the golf course environment, but the “what ifs” will still sometimes haunt me. Perhaps it is time that you head-off some potential challenges before somebody, including you, gets hurt or sustains a lifelong injury.

Looking at my Dad, now being challenged with an array of age associated maladies, I cannot help but consider what issues I will have that were exacerbated by my employment activities. None of that can be undone now, however I can take the steps to maintain my current health, no, actually improve upon my current health, so I can live a fine life into my eighties as well.

Take care of yourself, look at your parents and make a decision as to how you want to look and live your final years. Consider your staff and make sure that their years are golden too. As obvious as it sounds, responsible personal management starts today and will last the rest of everyone’s life.



Hazeltine National Golf Club
Photo by Jeffrey Hartman

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World Class Shaper Brings Skills Home: A Unique Bunker Challenge

By Dan Bieganek, of D. Beiganek Shaping



Greenside bunker on hole three at Town and County Club

My name is Dan Bieganek, a new affiliate member and very glad to be a part of this organization. I am a golf course shaper that has just returned recently from over 25 years of traveling around the world with a leading Golf Course Design firm. In 2012, I decided to return home to Minnesota and work independently. My first project landed

with a unique bunker style challenge and I would like to thank Jack Mackenzie for asking me to share this experience with you all in this edition. There would be a total of 44 new bunkers that were to be done on this project. The golf club I would be working for was looking for a style that appeared classic and should have the characteristics

of something that had been there for years. We studied photos and styles of courses like Flossmoor CC, Wilshire CC, Los Angeles CC and Merion CC to get an idea, then we got started.

The club had purchased a small dozer, a Cat D4G LGP (Low Ground Pressure). It's a 90 hp machine and very maneuverable for the small work areas, but capable of bulk earth moving during topsoil removal and rough shaping, while still being able to do fine details and fin-

ish shaping. A mini excavator, a Cat 303.5 was also purchased and equipped with a special 39-inch wide swivel bucket attachment giving an additional 180 degrees of tilt movement, plus 12-inch and 24-inch digging buckets for me to use on the project. The rest of the equipment significant to the project was already in the maintenance fleet, including a 2-ton dump truck, skid steer loader, trencher, sod cutter, sand pro and several Toro Workman utility vehicles for moving material around. The whole project was done in house and the golf course



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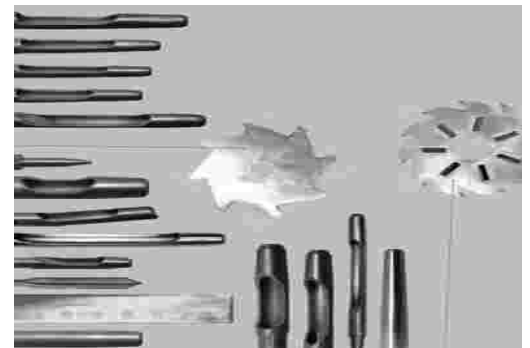
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remained open the entire time. Occasionally, we would close a Par-3 or do a temporary green on a longer hole, but normally very little impact on play.

When we started to strip the turf and prep for shaping, topsoil was a concern and we had anticipated that we may need to import material from an outside source. Fortunately, as we started stripping and stockpiling the existing topsoil, we found there was an abundance of good, pure, clean topsoil to place back over the finish product. The subsoil turned

out to be a nice mix of sandy loam and gravel, no big rocks to contend with, and the entire site drained very well across the surface and through the soil. These conditions made shaping a lot easier than some of the site conditions I have experienced, such as the rocky mountain sites of Japan or Korea, or the swamp conditions of Thailand and dry, dusty desert sites in Arizona.

Rough shaping with the dozer gave the bunker its basic shape and size. Blending in the new shape to the existing surrounds was the key to



A team effort and hard work made the project go quickly and limited impact upon play.

making it look natural. Visual appearance from the tee and fairway was also considered and modifications to the grades were made at this time to achieve the best view possible into the bunker. A lot of discussion with the Superintendent and Architect went on at this point regarding placement, depth and playability of the new bunker and any changes were shaped in until approval. Topsoil was then spread a uniform six inches thick, which is very important on this type of sandy subsoil to prevent future dry areas. Extra topsoil was placed nearby for detail work on the final prep.

A paint gun comes in real handy to determine sand lines. White or orange turf paint seems to be the most visible when you have to go back to the tee to view the bunker. Binoculars are a nice thing to have too, as the bare dirt is hard to read from a distance. After that, the mini excavator with the swivel bucket was used to core out the edges four inches deep and grade out, smooth out and compact the bunker floor. All the extra material was used on the noses and fingers to add a little more dimension and detail. The

bucket was then changed to trench the takeout drain line from the lowest point at least 12-inches deep and at a minimum of 1% grade either to a sump, or daylight to an area out of play.

The existing irrigation included the original from the 1930's, the second from the 70's, both abandoned and the current live system. Needless to say each work area was a challenge. The labor intense part began from here, as the maintenance staff came in to detail and hand shape the sand line edge, compact and detail the walk in noses and fingers and smooth out the floor. Any irrigation replacement or additions were done as well. Sodding was done as soon as possible so the sand edge had a chance to grow in and establish a strong, deep root system. All of the areas of the new shaped fairways and approaches that required bentgrass were harvested from the generously wide existing fairways in a sod exchange, so no new bentgrass sod had to be purchased.

Improving surface drainage around the green complexes and new bunkers were also part of the project.

Anywhere there were trouble spots or wear patterns, reshaping occurred adding contours, drain basins and take-away lines. This helped to disperse golfer access to multiple entry points on the greens depending on where the flag would be located. Cart path rerouting was also considered at each critical area. After all the main construction and planting was completed and had a chance to grow in, it was time for the final construction and sand placement in the bunkers. The drain lines were installed with perforated 4-inch tile and backfilled with pea gravel.

A product called Klingstone was chosen as a spray-on bunker liner to protect bunker sand from contaminants and improve drainage during heavy rain events. After it is applied, it takes a 24-hour period to cure. The sand is put in first with a 2-inch lift and water added, then compacted with a plate packer. The second lift was added after that and was then maintained at a uniform 4-inch thickness. The walk in noses and fingers will allow golfers to easily enter and exit the bunkers without having to climb a steep sand face which will ease maintenance

and help prevent the downward migration of sand.

The consistency and playing characteristics of the sand will be the same now throughout all of the bunkers, however the different styles and shapes will give the golfer a variety of recovery shots out of them. There is a mix of deep and shallow greenside bunkers ranging from four to eight feet deep. The fairway bunkers are not too deep, but your ball can come to rest in a variety of ways in one of the smaller capes or bays. From the middle of the bunker a forward shot can be made.

Some of the tees were also renovated that were either too small or didn't surface drain well. Whenever we had extra material such as old bunker sand or too much cut material, we would utilize that for tee construction. All the new tees were shaped as a rectangle and graded at a 1% from back to front and .5% from side to side, depending on which side the golfer enters the tee so that the water drains away from the entry side. A state of the art dual-plane laser was used to insure accuracy.



Klingstone is applied to stabilize the bunker base, prevent contamination and enhance drainage.

The Superintendent was great to work for, as he was in charge overall and delegated everything I needed to do my work efficiently while taking care of his own day to day operations of maintaining the golf course. We spent a lot of time planning and discussing things in the field, then implementing the work while following a budget and schedule. The rest of the staff was also very accommodating and willing to cooperate in any way they could. The days were long and hard during the peak of construction, but the

rewards sure paid off. The bunkers look great and the feedback from the members is very positive. I was real happy to be a part of this project and while in progress, it has also lead to a great working relationship with more golf courses that are also members of this organization.

I hope that my future here holds many more opportunities like this. I Thank you for taking the time to read this and I look forward to meeting many of you over the years and be able share more experiences.

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Monarchs in the Rough: Golf Courses Helping an Iconic Species

By Wendy Caldwell. Program Coordinator, Monarch Joint Venture

Do you remember your first encounter with a monarch butterfly? Perhaps it was your second grade classroom, or maybe you stayed up late with your grandmother to make sure you didn't miss the amazing transformation from caterpillar to chrysalis. These experiences last a lifetime. To ensure that future generations can build fond memories of monarch butterflies, we face a great challenge.

The challenge starts with creating, restoring or enhancing as much habitat as possible for these amazing insects. Monarch caterpillars can only eat milkweed, so this plant is vital to any monarch restoration



project. Each fall, the final generation makes a miraculous journey, often as far as 3,000 miles round-trip, as they migrate across North America to their overwintering and breeding destinations.

The Fall Migration

North American monarchs make up two fairly distinct populations (with



some genetic interchange between the two) separated roughly by the Rocky Mountains. In the fall, beginning primarily in mid-August, you are likely to see monarchs from the eastern population migrating south towards Mexico, where they will

spend the winter in high elevation Oyamel Fir forests. A central migratory route involves monarchs from locations in the Upper Midwestern U.S. and southern Canada, while

still other monarchs start along the Atlantic Coast and fly southwest toward Texas. A few monarchs on each of these routes don't fly all the way to Mexico, instead staying to winter along the Gulf Coast.

Butterflies often use thermals (updrafts of warm air) during their fall migratory flight to save energy, and fly at a pace of about 25-30 miles per day. These well-traveled butterflies spend the winter clustered together on the trunks and branches of Oyamel Fir trees, in a low-energy, non-reproductive state that biologists refer to as "diapause." They survive using stored fats produced from the milkweed they consumed as caterpillars and the nectar they drank from fall-blooming plants during their flight to Mexico. They keep warm by clustering together so densely that tree branches bend from their weight.

The Spring Migration and Summer Breeding Season

These same monarch butterflies begin their return trek northward from Mexico in March. Now, the focus is finding milkweed on which to lay their eggs. As early as the sec-



ond and third weeks of March, some butterflies have made their way through northern Mexico and into the southern U.S. on their search for milkweed.

Green Antelopehorn (*Asclepias viridis*) and Spider Antelopehorn (*Asclepias asperula*) milkweeds are among the first monarch host plants in the southern U.S., and are

the best plants for early-season monarchs in search of habitat. A number of other species are found in the region, which are also useful to monarchs. Visit www.plantmilkweed.org for more information.

The caterpillars munching on these southern milkweeds will grow to adult monarch butterflies that continue the journey to the northern parts of the U.S. and southern Canada.

These summer monarchs will produce two to three more generations, using milkweed species that grow in the northern parts of their breeding range, like Common Milkweed (*Asclepias syriaca*) or Swamp Milkweed (*Asclepias incarnata*), to name just a few. In the fall, instead of laying eggs, the final generation of the year will fly back to find the same Oyamel Fir trees, new to them, but visited by their ancestors a few generations ago.

There are many unsolved scientific mysteries about this incred-

ible migration, and these mysteries give us cause to pause in wonder. For example, we still don't know exactly how they find the same wintering spots year after year, nor what makes some of them stay in the U.S. throughout the winter instead of joining the millions that fly to Mexico. At the same time, what we do know about the migration of this insect is astounding, and what we witness, beautiful and inspirational.

Monarchs in Decline

This iconic insect is at risk of population decline. The monarch migration was listed by the International Union for Conservation of Nature as an endangered phenomenon in 1983. Currently, the U.S. Fish and Wildlife Service is conducting a status review to determine if the butterfly warrants being listed as a threatened species under the Endangered Species Act. During the

winter of 2013-2014, monarch numbers in Mexico reached an all-time low, with the number of monarchs estimated at about 30 million, compared to nearly 1 billion monarchs in 1996-97. The 2014-15 brought a slight population rebound, but remains critically low.

While the plight of monarchs in overwintering groves in Mexico has received much attention, the



monarchs' problems are not in Mexico alone. A decline in the number of western monarchs, most of which spend their entire life cycle in the U.S., has been well-documented over the past decade. The number of monarchs overwintering in both Mexico and California is dependent upon habitat quality, not only in these overwintering sites but throughout their breeding and migratory ranges in the U.S., as well.

In the U.S., monarchs face a decline in breeding habitat quality and availability, as we've lost a

lot of milkweed from the landscape through habitat conversion and changes in land management and agricultural practices. Without milkweed, monarchs cannot reproduce and continue their life cycle.

Pesticides used to control other insects, especially crop pests and mosquitoes, can have fatal, unintended impacts on monarchs. Additionally, climate change may impact milkweed availability, quality, and distributions; summer and fall droughts, such as what we saw in Texas and throughout the central



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U.S. in 2012, can dramatically reduce the availability of flowers from which monarchs can gather the nectar they will need to fuel their flight to Mexico and survive the long winter.

Monarch Conservation and the ‘Monarch Joint Venture’

In the fall of 2008, recognizing a need for a coordinated conservation effort, the U.S. Forest Service International Programs gathered a group of monarch conservationists to evaluate the feasibility of a ‘joint venture’ effort. With enough

interested and dedicated parties and a bold vision for monarch conservation, the Monarch Joint Venture (MJV) was formed. Current members of this coalition include several federal and state agencies, conservation-focused NGOs, and academic organizations. MJV partners have agreed to work together on a common goal of monarch conservation throughout the lower 48 United States. This joint venture concept is not a new one. Since the mid-1980s, this model has proven successful in building collaborative, coordinated conservation efforts for migratory birds.



To protect North American monarch populations and their incredible migrations, the MJV is using a science-based approach to conserve, maintain and improve monarch habitat. Additionally, the MJV will work to promote education to enhance awareness of monarch conservation issues and opportunities, as well as to encourage scientific research and monitoring to inform monarch conservation efforts. It promotes monarchs as a flagship species whose conservation

will sustain habitats for a variety of important species, including many plants, pollinators, and other animals.

We look forward to forming many more partnerships with groups interested in working toward monarch conservation and pollinator-friendly habitat management. Please join us in our effort to conserve monarch butterflies, their phenomenal migration, and habitat for monarchs and other pollinators alike.

How Golf Courses Can Help

Golf courses are prime locations for many activities outside of golf. Growing up, I used to frequent golf courses throughout the state to partake in cross country running events. I recently enjoyed hiking at a Minnesota State Park with a golf course inside it. Knowing some “golfers” myself, I’d say that some go more for the social aspect of golfing than for the sport itself. Why not add an additional benefit to golf courses by enhancing the habitat to support monarch butterflies? You might not want to tee off

in the midst of a milkweed patch, but milkweeds and other nectar-rich flowers could brighten the marginal lands outside of the course greens.

In addition to adding a splash of color to the landscape when blooming, these plants serve as the critical habitat that monarchs and other pollinators need to survive.

When thinking about areas that might be suitable for monarch habitat on your golf course, there are a few things to keep in mind. First, your main goal is to attract insect pollinators, so make sure that you choose areas with minimal risk of pesticide application or drift. You

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don't want to attract monarchs to a site and then accidentally kill them with a pesticide application. Size is another important factor. Monarchs move from patch to patch quite easily as they nectar and lay eggs. One of our main goals is to enhance this patchwork of habitats to ease these movements of monarchs, pollinators and other wildlife. A matrix of connected natural areas (small, medium, and large) will benefit many species.

Installing a simple butterfly garden around your clubhouse would be a great first step to help

monarchs, and would also drive great publicity for you. Once you have installed or enhanced lands with native milkweed and nectar plants, there are abundant opportunities for continued engagement. Help researchers understand monarch biology by volunteering for monarch citizen science programs, which are listed on the Monarch Joint Venture website, www.monarchjointventure.org. In addition to contributions to real scientific efforts through citizen science programs, there are many other outreach activities to engage different groups. Ranging from basic



A monarch butterfly with orange and black wings is perched on a tall, slender purple flower stalk in a field of tall, dry grass. The background is a soft-focus landscape of rolling hills under a clear sky.


informational presentations to activities and crafts for kids, monarchs have the ability to attract and inspire a broad audience.

To make your golf course more monarch-friendly, start by planting milkweed (additional nectar sources are important, too)! From there, the opportunities to engage others are endless.

Wendy Caldwell is the coordinator of the Monarch Joint Venture, a national partnership working to conserve the monarch butterfly migration. In this position, she works with over 30 partner organizations across the U.S. to protect and restore habitat for monarchs and other pollinators. Prior to her role with the Joint Venture, Wendy worked for Dr. Karen Oberhauser at the University of Minnesota Monarch Lab, leading the Monarch Larva Monitoring Project and assisting with research efforts and educational workshops for teachers.

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The Story of a Little Droplet: Increasing the Efficacy of Your Sprays

By Aaron Johnsen, Marketing Manager, Winfield

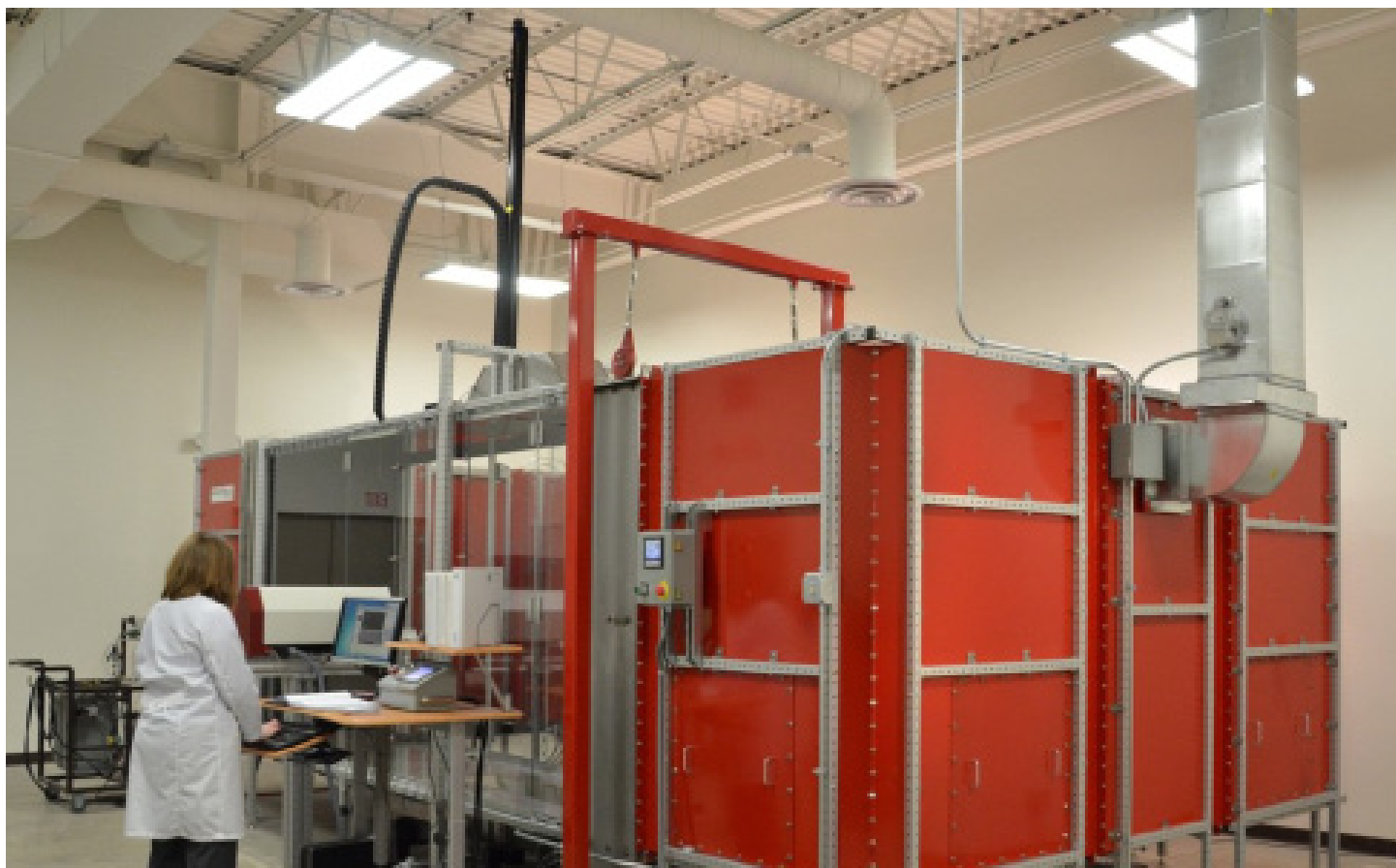
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Consider the value of your spray; the cost of product, the labor to apply and the health of the plant. You may not want to admit it, but there is almost no chance that 100% of your spray is hitting your intended target. The droplets may bounce, drift or evaporate. This not only reduces the efficacy of your spray but it reduces the value of the investment you've made. By better understanding the optimum droplet size, what affects the size of a droplet and how to increase the number of droplets hitting your intended target, you can make the best use of your time and money.



Image 1: Water sensitive paper showing the spray droplet distribution from three different nozzles





A photo of the wind tunnel at Winfield's River Falls Research Facility that is used for analyzing spray patterns. This is one of only three in the United States and the only one owned by a private company.

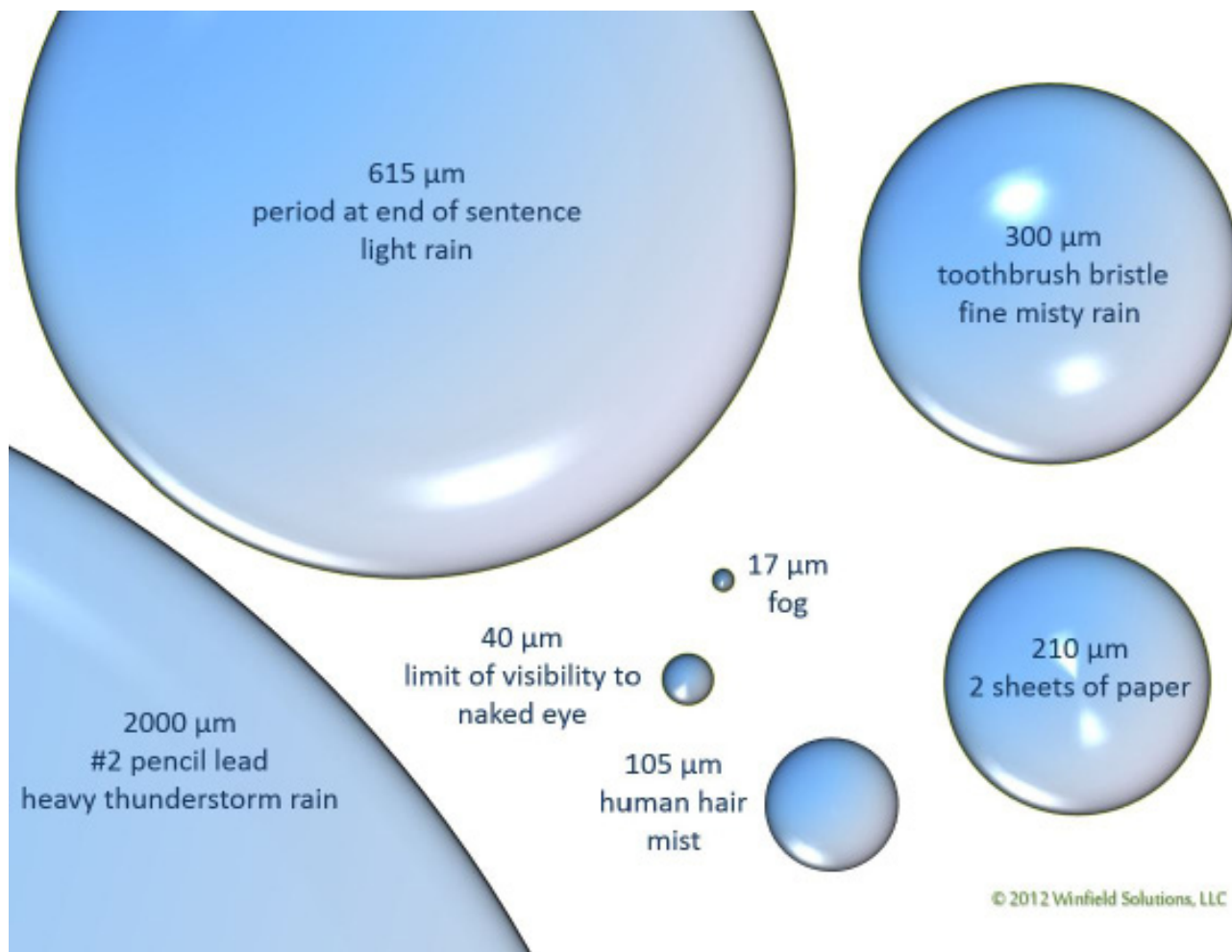
Before we get to the fine details (that's a joke you'll get by the end of this article), besides maximizing your input investment, why should you care? For the past several years, the EPA has been exploring additional label language that focuses on reducing drift. The language includes items such as increased buffer zones, specific nozzle requirements and approved tank mixes. The EPA is currently implementing some of this language on newer products hitting the market. It is likely only a matter of time before this language is widely implemented on turf and ornamental labels. This could require equipment changes and additional spray applications for you to accomplish your job.

The Optimum Droplet Size

The optimum droplet size depends on what you're spraying and the current weather conditions. Research shows that the ideal droplet size is somewhere between 200 and 600 microns, based on the following insights:

- 40 micron droplets (the smallest droplet a human eye can see) generally hang in the air and do not reach the target. These size droplets are susceptible to drift and evaporation.
- 100 microns droplets (similar to the diameter of human hair) provide excellent leaf coverage and quick drying time, but are still highly susceptible to drift and get caught at the top of the plant canopy. In a square inch, approximately 11,750 - 100 micron droplets can fit.
- 200 microns droplets (similar to two sheets of paper) provide excellent coverage, but are slightly susceptible to drift and only provide moderate canopy penetration. Droplets of this size are best for contact pesticides. In a square inch, approximately 1,425 - 200 micron droplets can fit.
- 350 microns droplets (similar to misty rain) have low drift potential and good canopy penetration, but coverage decreases and they are susceptible to bouncing off the target. In a square inch, approximately 180 - 400 micron droplets can fit. Droplets that are this size and larger are best for systemic pesticides.
- 600 microns droplets (similar to the size of a period at the end of a sentence) are resistant to drift, provide great canopy penetration and long drying time, but have very low coverage and significant bounce. In a square inch, approximately 40 - 600 micron droplets can fit.
- Droplets larger than 600 microns mostly bounce off the target, providing little to no efficacy.





Depiction of droplet sizes.

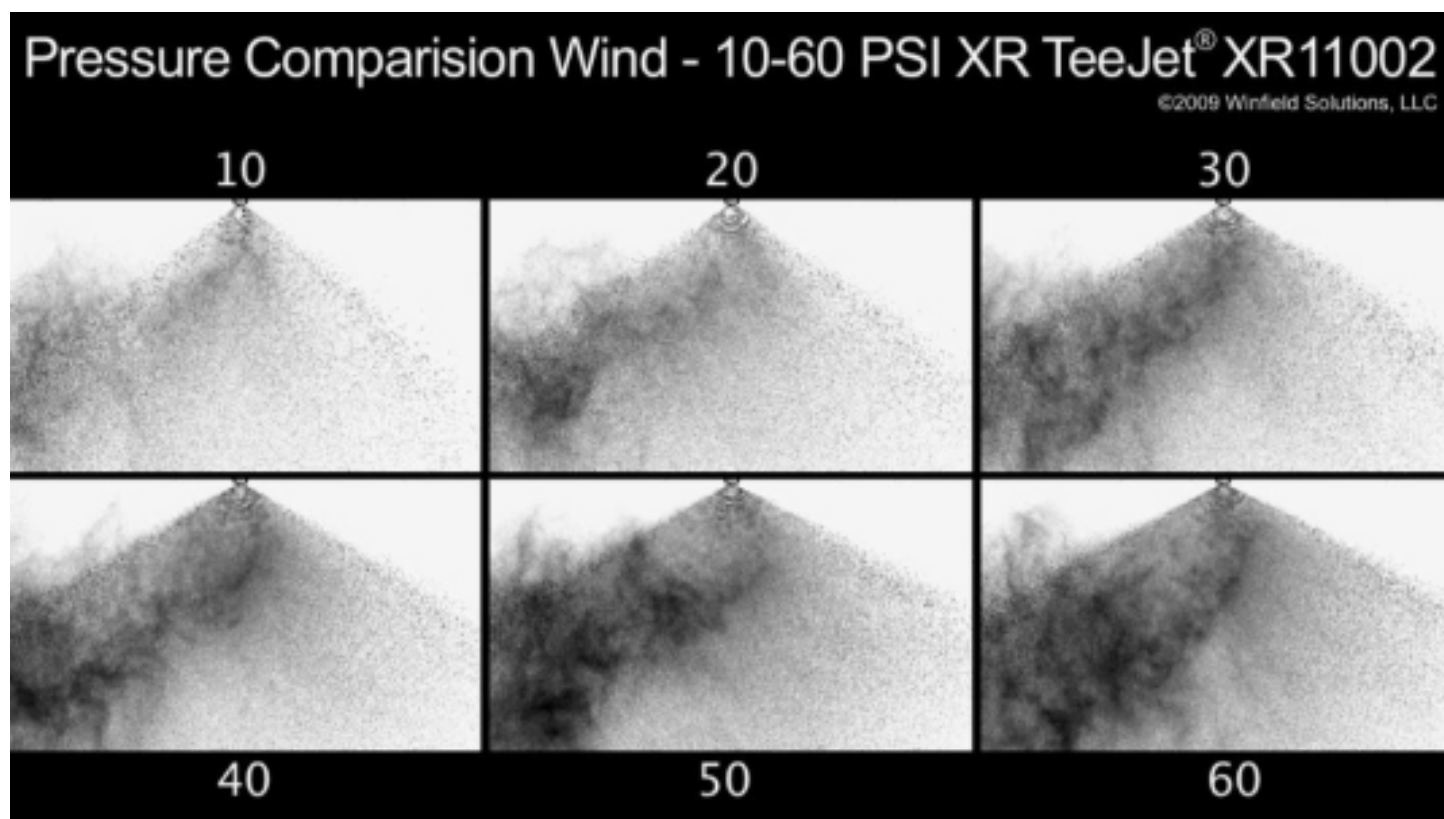
Managing Droplet Size

Spray droplets are affected by the pesticide mix, equipment variables and weather conditions. Through research conducted in the WinField wind tunnel, the following information has been collected:

Holding nozzle type, pressure and application volume constant, the number of small droplets (below 105 microns) varies based on the pesticide mix. Winfield has tested over 500 different active ingredients to determine their impact on droplet size. For example, in one study with XR11008

nozzles water alone produced 4.2% small droplets, while Primo® (6 fl oz per acre) produced 6.2% small droplets and Heritage® TL (2 fl oz per 1000 sq ft) produced 8% small droplets. In the same study, Civitas One® (2.9 gal per acre) and a mixture of Civitas One® plus Topaz (16 fl oz per acre) reduced the small droplets to 2% of the spray. As pesticide mix changes, the number of small droplets and overall distribution of droplet sizes change.

Equipment has the largest impact on droplet size with two key factors – pressure and nozzle type – affecting the outcome. Beyond these factors discussed, older, worn equipment will cause poor droplet distribution, so it is recommended that all parts be maintained regularly and replaced as needed.



Shows the effect of spray pressure on a nozzle. Greater darkness means more fines.



Increasing spray pressure will decrease the size of droplets, which leads to more drift. For example, an AI11005 nozzle has a median droplet diameter of roughly 375 microns at 100 psi. At 60 psi, the median droplet diameter increases to 500 microns. At 30 psi, the median droplet diameter increases to 650 microns. Most nozzle manufacturers provide the average spray droplet size for various pressures, so consult spray nozzle catalogs for nozzle specifications.

Nozzle type affects the size of droplets leaving the sprayer. Winfield's has tested nozzles that produces as much as 23% small droplets (<105 microns) and ones that produce as little as 0.25% small droplets. As a general rule, fine nozzles produce droplets that are 200 microns in size, medium nozzles produce droplets that are 300 microns in size, coarse nozzles produce droplets that are 375 microns in size, and very coarse nozzles produce droplets that are 500 microns in size. Other factors to consider include:

- o Wider angle nozzles, such as 110 degree compared to 80 degree, produce more small droplets.
- o Older nozzles tend to produce more small droplets.
- o Nozzles producing two streams tend to produce smaller droplets.
- o Nozzles that inject air into the droplet produce larger droplets and fewer small droplets – in one study XR11008 produced 13.1% small droplets, while AI11008 produced 1.2% small droplets.

Temperature and humidity also affect droplet size. As the temperature rises and or humidity decreases, droplets size will decrease as the droplet falls from the nozzle to the ground. However, as the temperature drops or humidity rises, droplet size will not be affected. Therefore, an application made in the spring may get more active ingredient to the target than an ap-



plication made in late summer.

Increasing the Number of Droplets Reaching Your Target

Realistically, pesticide mixes are not going to be altered to create more effective droplet sizes, although the EPA may be controlling mixes. While weather conditions cannot be controlled, applications should be applied in the most optimal weather. Adjustments to your equipment can be made to optimize droplet size. Reducing spray pressure to 30-40 PSI will limit small droplets and maintain the spray pattern. Ideally, the coarsest nozzle that still produces the desired plant coverage should be used. It is important to consider the product mix when selecting the nozzle type. When applying contact products or looking for foliar absorption, a nozzle



The proper equipment settings, boom height and nozzle spacings will dramatically affect the productivity of the application.



that produces smaller droplets is desired. When applying a system product a nozzle that produces medium to coarse droplets is desired. When applying a product to the soil and even coarser nozzle can be used.

Even after optimizing basic equipment components, there are other steps that can be taken to increase the number of droplets reaching the target. The two primary considerations are the addition of covers to the boom and adjuvants to the spray mix.

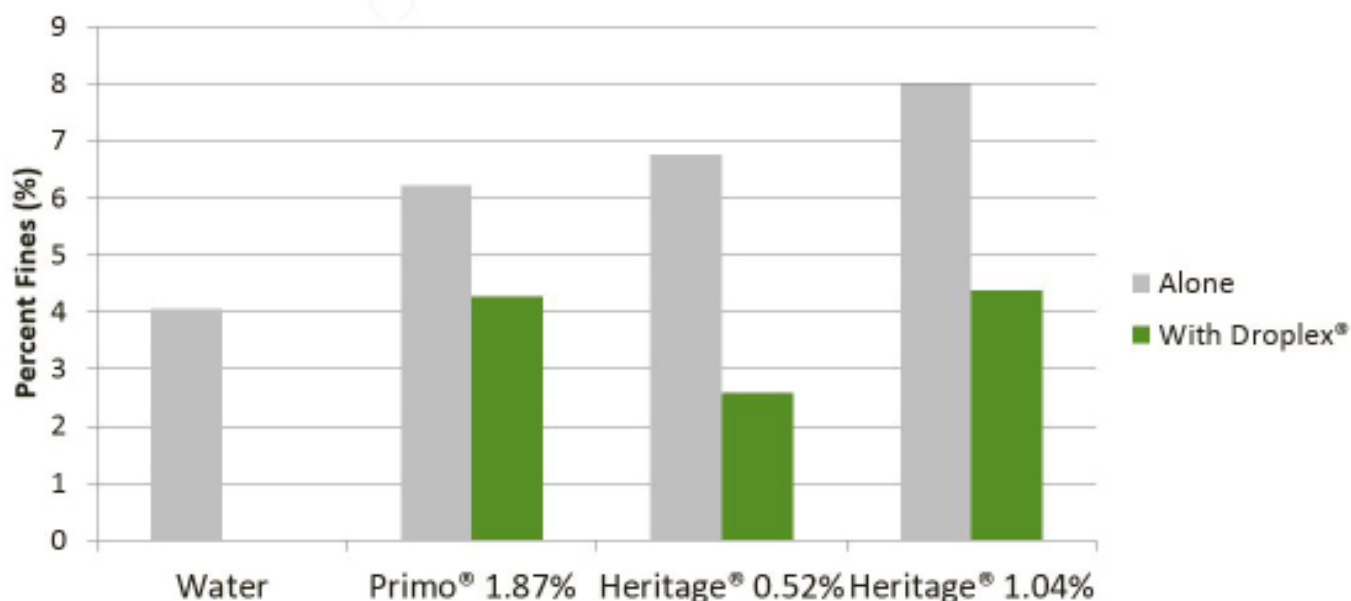
Boom covers are a protective shield that hangs over the boom. They are very effective at blocking the wind from catching small droplets and carrying them away from the target. However, some users run into problems when the small droplets collect on the inside of the cover and drip on the target in higher concentrations.

To further manipulate the droplet size, two types of adjuvants that can be used - polymer based and oil based drift adjuvants. Polymer based drift adjuvants increase the viscosity and tension among droplets causing them to get substantially larger. Think of a glue bonding two things together. Oil based drift adjuvants cause an increase in attractiveness among droplets causing them to get larger. Think of a magnet that is stuck together but can be pulled apart. One study in the wind tunnel showed;

- Water alone had 19.4% small droplets and an average droplet diameter of 177 microns.
- A mix containing a polymer drift adjuvant reduced the small droplets to 9.1% and increased the average droplet diameter to 299 microns.
- A mix containing an oil drift adjuvant reduced small droplets to 8.2% but only increased the average droplet diameter to 211 microns.



DROPLEX® ADJUVANT REDUCES NUMBER OF FINE (<105UM) PARTICLES

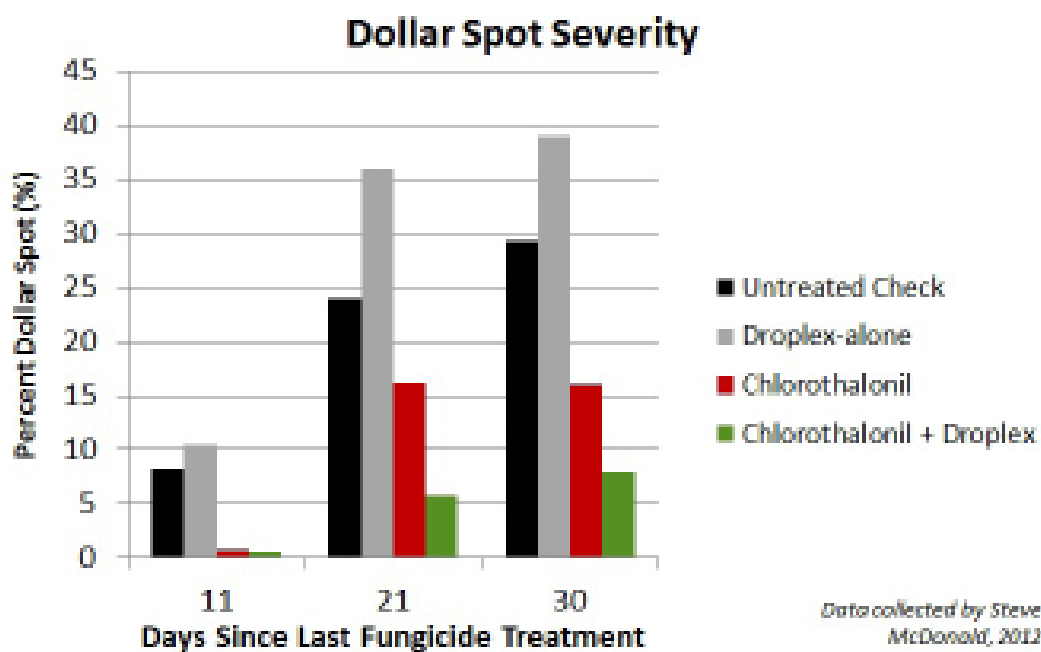


*Analysis conducted in Winfield Spray Analysis System with XR11008 nozzles.
Heritage® sprayed at 80 gal/acre, Primo® sprayed at 65 gal/acre
Droplex® adjuvant applied at 8 fl oz per 100 gal*

Winfield's research says that both polymer and oil drift adjuvants tend to do a similar job reducing small droplets, but polymer drift adjuvants tend to create significantly more large droplets. Often, the polymer agents will shift a significant number of droplets beyond the optimum droplet size. Further, the enhanced tension created by polymer drift adjuvants tends to cause pattern collapse – in which the width of the spray coming out of the nozzle is reduced, leading to streaking and lack of complete spray coverage. Therefore, Polymer drift adjuvants are best targeted towards use out of single nozzle applications, back pack sprayers and boomless nozzles, while oil based drift adjuvants are best used with boom sprayers.

Winfield has also invested in field based research to understand how the addition of Droplex® adjuvant, an oil based drift adjuvant improves prod-

uct performance. In one study conducted by Steve McDonald at Turfgrass Disease Solutions, the addition of Droplex® adjuvant to the active ingredient maintained dollar spot incidence below 8% over 30 days, while the active ingredient alone only maintained dollar spot below 10% for under 21 days and had over 15% dollar spot at 21 days and beyond. In another study conducted by Dr. Brandon Horvath at the University of Tennessee, the addition of Droplex® adjuvant reduced the number of dollar spot infections by more than 10 infections compared to plots treated with only Secure® or Daconil® over a 30 day period. Sam Bauer at the University of Minnesota also conducted a study in which plots treated with the Droplex® adjuvant had 4% more dandelion control than those treated with the active only. It is believed that the reduction in small droplets – that would otherwise not hit the target – means more active ingredient reaches the target, therefore, leading to enhanced control.



Research trial from Steve McDonald, showing improved dollar spot control when Droplex is put in the spray tank.

The droplets coming out of your sprayer have various sizes. Depending on the product being applied there is an optimum droplet size. The smaller the droplets, the less likely they will reach the target. The larger the

droplets, the less likely they will be absorbed by the target. Spray equipment has the greatest effect on droplet size. Dialing in the spray pressure and selecting the right nozzle can optimize droplet size. Even with a highly tuned sprayer, droplets can still not reach the target. Introducing boom covers or adjuvants can enhance the number of droplets reaching the target. More droplets to the target, means more active ingredient reaching the target, which means greater control and the best use of your spray investment. It also prepares you to deal with future direction provided by the EPA.



***Aaron Johnsen
Marketing Manager***

Aaron holds a B.S. in Horticulture with a Turfgrass Science emphasis and an M.S. in Applied Plant Science from the University of Minnesota. Aaron has experience in the industry with golf course maintenance, turfgrass and ornamental research, measurement technology and sales. He has had multiple speaking engagements across the country and published several articles in trade magazines and research journals. Aaron is currently a Marketing Manager in Winfield's Professional Products Division. In this role, he is responsible for product development and technical support for Winfield customers and staff as well as product line management.

The membership of the MGCSA thank Aaron for his professional insights and technical assistance.



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Advisory: Golf Course Contamination from Pesticide Use

April/May 2015 (Bulletin 7)

Contact

Cathy Villas-Horns

651/201-6697

cathy.villas-horns@state.mn.us

The Minnesota Department of Agriculture (MDA) wants golf course superintendents to know that high levels of mercury and arsenic were detected at a Twin Cities west metro golf course being converted into residential property. Elevated concentrations of arsenic and chromium were found in soil below tee boxes and greens. Those values exceed residential use as established by the Minnesota Pollution Control Agency.

The high levels are likely a result of normal, legal use of certain herbicides and fungicides over many years. However, the agency is concerned that other golf courses may have similar contamination. We urge superintendents to conduct assessments and take appropriate measures if contamination exists. A few facts:

FACTS

- Elevated concentrations of mercury, arsenic and chromium were detected in soil below tee boxes and greens
- Former golf course operator used Calo-chlor®, a mercury-based fungicide canceled for use in 1994.
- Contaminated soil was removed and safely disposed of at a permitted landfill.

CONCERNS

- As other golf course properties are being developed, similar contamination may be found.
- Residential property dwellers may face potential risk if their units are built on land that was developed from a golf course using pesticides with mercury or arsenic.
- Prior use of 'legacy' pesticides containing mercury or arsenic can potentially contaminate soil, groundwater and surface water.

RECOMMENDATIONS

- Contact the MDA Incident Response Unit for assistance through the Agricultural Voluntary Investigation & Cleanup (AgVIC) program, Pesticide & Fertilizer Management Division, 651/201-6681.
- Consider this an environmental and public health risk that needs to be addressed.
- Hire a consultant experienced in pesticide soil sampling/remediation to conduct further tests. Identify affected areas: greens, tee boxes, mixing, loading and pesticide storage areas.
- Collect water samples at adjacent surface water bodies and shallow groundwater for testing.
- At a minimum, test soil for arsenic, barium, chromium, lead, mercury, selenium, silver and other pesticides applied to the greens and tee boxes.

The MDA is the lead state agency for all aspects of pesticide and fertilizer environmental and regulatory functions. The Pesticide & Fertilizer Management Division (PFMD) works with partnering agencies, the farming community and regulated industry to serve the citizens of Minnesota, strengthen our agricultural economy and to protect the environment. The PFMD Incident Response Unit provides comprehensive site cleanup assistance to parties affected by agricultural chemical contamination. Please let us know if you have questions.

MGCSA Hole Notes Magazine Affiliate Spotlight: S&S Tree and Horticultural Service and Maier Tree & Lawn



The hard work and entrepreneurial spirit of founder Steve Sylvester started with his upbringing in South St. Paul, MN. With his mind for business, Steve began S&S Tree and Horticultural Specialists in 1976.

At that time, the only services provided were gravel installation, landscaping, and tree care. In the late 1970's, S&S's business began to grow as the demand for tree removal became overwhelming due to the devastating effects of Dutch Elm Disease in the area.

Over the next twenty years, S&S continued to grow and expanded its service offerings to include plant health and lawn care services. In 2004, S&S expanded again to begin processing our wood debris into mulch.

In 2012, S&S joined the Ohio-based Davey Tree Expert Company. This new relationship allows us to merge with a company that shares our core values and commitment to client satisfaction. You'll continue to receive the same expert knowledge and care from us, as well as the high level of client satisfaction and personal services you've come to expect.

S&S Tree and Horticultural Specialists proudly offer the best tree and lawn care in the Twin Cities, St. Paul, and Minneapolis communities. With a continued commitment to ongoing education, training, safety, and a passion for customer satisfaction, we hope you will allow us the opportunity to show you what it means to be part of the S&S family of customers. Rob Neeser is the area S&S Tree and Horticultural



Above: Rob Neeser, S&S Tree and Horticultural Service

Service representative.

Maier Tree & Lawn, a Davey company, had its roots in The Davey Tree Expert Company long before founder Jay Maier started the business in May of 2000 in Rochester, Minnesota.

Maier started with Davey in 1994, right after receiving his bachelor's degree in forestry from the University of Missouri. After working as a foreman, Maier started his own firm and operated it for 14 years before Davey acquired his tree

care business.

“Entrepreneurship has always been a part of me,” Maier said. “In 2014, I realized the passion I had grown to love was making an impact in arboriculture and in people’s lives, and I was looking for ways to do that on a bigger scale when the opportunity with Davey came about.”

The acquisition gave Maier’s clients access to Davey’s diversified service offerings, which include the research and development expertise

of the Davey Institute and environmental consulting via the Davey Resource Group. Davey, founded in 1880 by John Davey, the original tree doctor, is North America’s oldest tree care firm.

In addition to his duties at Maier Tree, Maier was recently promoted to district manager of S&S Tree and Horticultural Specialists, a Davey company, in St. Paul, Minnesota.

In Minnesota, Maier Tree & Lawn and S&S Tree and Horticultural Specialists have worked with a number of golf course owners and managers.

“Often a course will call us in to correct a situation with a tree that could have been prevented had a certified arborist been involved from the start,” Maier said. “For those highly valued trees, it’s best to trust tree care to the experts.”

The best advice Maier can offer to golf course managers for maintaining and getting the most value out of their trees is to conduct a tree inventory. Davey’s certified



Above: Jay Maier, Maier Tree and Lawn



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arborists can conduct an inventory to gather important information for course managers, including tree location, condition, risk level and prioritized maintenance needs.

The inventory data can then be managed in TreeKeeper®, Davey's innovative, easy-to-use software program. Using Treekeeper, with a few taps on a screen or clicks of a mouse a course superintendent has the ability to calculate the total number of a given species, such as ash trees, to prepare for the arrival of a pest like the Emerald Ash Borer. Such data helps course managers prepare removal and treatment estimates and have more options for dealing with a forthcoming expense.

Inventories also track maintenance and installations to aid in budgeting for current and future seasons.

Maier said his goal is to help golf courses maintain and protect healthy trees with pruning, cabling, lightning protection, and treatment against pests and diseases rather than simply removing trees when a problem arises.

“Golfers, course designers and superintendents all know the important role trees serve in the aesthetics and play of a course,” Maier said.

“We want golf courses and their patrons to enjoy all the benefits their trees have to offer.”



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Within the Leather

by David Kazmierczak, CGCS

"The Living Legacy"

A few columns ago I extolled the virtues of being a

mentor and creating a legacy of people who have worked under you to succeed in this great business of ours. Heck, not just our business but any field of work. It was the idea that these people create a legacy based on your teachings, interactions and reactions whether it is on the golf course or otherwise.

I suppose the column was based a couple factors; one, being that I was in the company of a superintendent or two that had a very great legacy, and two, that at age almost 50, these kind of thoughts creep into the consciousness more frequently. My last two children have just graduated from high school and my body seems to be in a constant state of some sort of minor ache or pain from what I perceived was normal activity. Can't wait for the next 30-40 years!

But as I drove the course the other day with this idea of mid-life self-

observance in mind, (no, this does in way qualify as a mid-life crisis), I began to wonder about the other aspect of legacy- the golf course itself.

Being in charge of a golf course is a special thing and I am sure nobody reading this column needs to be convinced otherwise. It becomes your course. It becomes your piece of ground and everything about its care is a reflection on your ability, intellect and guidance and the people who work for you. It's your baby until you or somebody else decides it is somebody else's turn. Hopefully it's you making that decision.

I am fortunate here at Prestwick in that I have been able to grow with the golf course. We have been renovating since my first year and I have been able to assist in some of the major and minor decisions concerning the structure and layout of the golf course. It is very gratifying to look at a hole or a bunker and say that you had the idea or was allowed to make the decision to make that thought a reality- thus creating a legacy.

In relative terms, 15 years can be a long time at one course and a heck of a lot of stuff can, and in

our case has, been accomplished in that period of time. Some superintendents last 25, 40 even 50 years at a golf course which is astonishing.

I have had a chance to have a couple of former workers, superintendents, architects, come back to Prestwick over the past 15 years and give me a sort of history lesson. I have also talked or met with any number of superintendents from across the country that have had renovations done, things altered, etc. and have noticed some trends. Basically, unless the course was completely blown up and re-started, it is pretty rare that the basic layout of the golf course changes much. The routing, in general, is pretty static. Greens can be changed, but that is usually up to the architect, owners. Bunkering, water features and tee placement once again are primarily architect related although the superintendent may have a large impact on these decisions. The one area that I have found can create a lasting legacy on the course by us both coming and going is: trees. Now unless you are a true links course, trees become one of the places where you as a superintendent can truly make your mark. The decisions on placement, type and care of trees is almost always left

in our hands and can greatly impact the course, its playability, its look not just now, but for years to come. Whether you believe the things are majestic creations of God or giant weeds or somewhere in-between we can all agree nothing evokes emotions from golfers, homeowners, owners, golf pros, you name it- like a tree.

Now don't get me wrong. I'm no tree hugger. I am quick with a chain saw if things go awry with most of our trees. I have, however, formulated a tree plan for this golf course over the past ten years that includes additions, subtractions, thinning, filling, species variation, strategic planting, and a whole lot of care. As I look from the ten-year trees to the 125 or so we just dropped in the ground over the last few weeks, I am reminded of what trees can mean to the course, and how a tree actually will become your living legacy long after you have sailed into the sunset of golf course maintenance care.

They probably won't be naming a tee complex after you, or a building, or even remember your name three years after you are gone, but the trees you plant today will sing your praises for a long, long time.