Foo Foo Dust

By Dr. Wayne R. Kussow
Department of Soil Science
University of Wisconsin-Madison

Last fall, a unique opportunity arose to test a turf product **before** it was marketed. The product? Earthworm casts. The casts presumably have wondrous effects on sod establishment that go well beyond that of a nutrient source.

With Randy Smith's cooperation and assistance, a segment of an abandoned fairway was stripped and earthworm casts, as well as composted municipal solid waste, Milorganite and Scotts ProTurf 19-26-5, were soil-applied. Half the plots were rototilled and the entire area sodded on August 28 with a commercially grown Kentucky bluegrass sod.

Chemical analyses of the earthworm casts and composite municipal solid waste are presented in Table 1. Both materials were touted as having 2% N. As shown, neither product came close to this N content.

TABLE 1.
CHEMICAL ANALYSES OF EARTHWORM CASTS AND COMPOSTED MUNICIPAL SOLID WASTE.

	Earthworm Casts	Composted Municipal Solid Waste
Macronutrients (%)		
N	1.15	0.44
P	0.54	0.24
K	1.05	1.03
Ca	8.80	2.61
Mg	1.94	0.88
S	0.56	0.32
Micronutrients (ppm)		
B	67	39
Cu	139	159
Fe	30,630	28,990
Mn	922	474
Zn	466	394
Organic C (%)	30.9	15.5
C:N Ratio	26.9	35.2

Observations

Our observations focused on root development, since this is the primary concern in sod establishment. Soil samples removed on October 14, 48 days after sodding, revealed that no rooting extended more than two inches into the underlying soil. The earthworm casts and composite municipal solid waste did appear to have enhanced rooting at this time (Table 2).

After an additional 44 days, on November 27, maximum rooting depth was 3.5 inches and occurred where the composite municipal solid waste and Milorganite had been applied (Table 2). Apparently by this time, all the foo foo dust in the earthworm casts was exhausted or was inactivated by cool weather.

Root development beneath the sod was examined again this spring (Table 2). We found that between November 27, 1989, and the May 14, 1990, sampling date depth of rooting had increased from approximately 3 inches to nearly 12 inches. Root densities in the 0 to 6 inch soil depth were enhanced by all of the soil treatments, but more so by composite municipal solid waste, Milorganite and the 19-26-5 than by the earthworm casts. Treatment effects on rooting at the 6 to 12 inch soil depth were slight and not significant.

TABLE 2.
EFFECTS OF VARIOUS SOIL TREATMENTS ON SOIL ROOT DEVELOPMENT

Soil Treatment	Root Density Oct. 14 0-6″	Root Density May 14 0-6″	Root Density May 14 6-12″	Rooting Depth on November 27
	mg roots/cm³ Soil			inches
Earthworm Casts	1.00	0.92	0.24	2.6
Composted Waste	0.73	1.18	0.26	3.5
Milorganite	0.51	1.14	0.22	3.5
19-26-5	0.63	1.15	0.19	3.3
Control (no treatment)	0.54	0.77	0.23	2.9

Color of the turfgrass was rated twice last fall and again on two dates this spring. Fall color in the earthworm cast and municipal solid waste plots was worse than in the control plot (Table 3). An explanation for this is the fact that these materials have C:N ratios that range from 26.9 to 35.2 (Table 1). Rapid microbial decomposition of any organic material with a C:N ratio of approximately 30 or more can occur only if the microbes have access to inorganic N in the surrounding soil. In effect then, the microbes compete with plants for available N. The microbes have never been known to lose this battle.

TABLE 3.
EFFECTS OF VARIOUS SOIL TREATMENTS ON SODDED TURF COLOR RATINGS*

Soil Treatment	COLOR RATINGS Fall 1989	Spring 1990
Earthworm Casts	7.6	7.1
Composted Waste	7.6	6.8
Milorganite	8.4	7.9
19-26-5	8.6	8.2
Control	8.0	6.8

*Scale 1-9; 1 = Brown, 7 = Minimally acceptable, 9 = Very dark green

This spring the turf established on soil treated with Milorganite and 19-26-5 had decidedly better color (Table 3) and faster growth rates than where the earthworm casts and composite municipal solid waste had been applied. These differences probably reflect differences in the amounts of N applied. The Milorganite and 19-26-5 appli-

(Continued on page 13)

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(Continued from page 11)
cations each provided 2 lb. N/M while the earthworm cast and composite municipal solid waste treatments provided only 1.15 and 0.44 lb. N/M respectively.

TABLE 4.
EFFECTS OF ROTOTILLING ON SOD ROOTING AND COLOR.

	Rototilled	Not Rototilled
Root Density, mg/cm³ Soil		
October 14, 1989	0.77	0.59
May 5, 1990	1.07	0.99
Rooting Depth, inches		
October 27, 1989	3.3	3.0
Turfgrass Color		
Fall, 1989	7.8	8.2
Spring, 1990	7.3	7.2

Effects of rototilling on turfgrass root development were quite pronounced in the fall of 1989 (Table 4). On average, rototilling increased root growth 30% and rooting depth by 10%. On the other hand rototilling resulted in poorer turfgrass color. By May 5 of this year, these effects of rototilling on root development and turfgrass color were virtually non-existent.

Summary

Earthworm casts are not a miracle turf product, nor do they necessarily contain that 2% N that is often cited in literature. What little response there was to the product was temporary and of no real consequence as far as sod establishment and turf quality were concerned.

The most important lesson learned from this study has nothing to do with turf per se. Promises of financial support for this study were never fulfilled. Thus, foo foo dust and fairy dust are very similar — one puff of hot air and they are gone, never to be seen again!

Periodical Cicadas

By Karen Delahaut and C.F. Koval
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University of Wisconsin-Madison

After a hiatus of 17 years, periodical cicadas will emerge this year. These large insects will emerge suddenly and unexpectedly by the thousands within a time span of several days.

Known for their deafening song, periodical cicadas will overwhelm parts of southern Wisconsin this spring. Brook XIII — as the group in this area is called — is one of two types of cicada expected to appear this season. The Dog Day cicada, the more common species, appears annually in mid to late summer.

There are two distinct races of the periodical cicada; one requires 17 years to complete its life cycle and is located primarily in the northeastern United States and the 13-year cicada which is more abundant in the southeast. There is a rather distinct line of demarcation between the two races; however, areas of overlap do occur. The 13-year and 17-year races are identical in appearance but apparently do not cross-breed.

Each race is further divided into broods. Broods are populations of cicadas which are separated both geographically and temporally. Scientists believe that originally there was a single brood. Unusual environmental conditions may have hastened or retarded nymph development by one or two years in some areas, thereby producing a local brood. Such conditions, if they continue, may further subdivide the brood in time. The fact that successive broods do not strongly overlap geographically suggests that competition reduces the successful establishment of straggling broods.

Brood XIII is composed of the species *Magicicada septendecim* and a smaller, almost identical variety, *Magicicada cassini.* This is the predominant brood in the southern Wisconsin counties of Crawford, Dane, Grant, Green, Iowa, Jefferson, La Fayette, Milwaukee, Richland, Rock, Sauk, Walworth, and Waukesha. Brood VI, a smaller brood predicted to emerge in the year 2000, is more centrally located in Wisconsin than Brood XIII. Historically, Brood VI has been sighted in Burnett, Columbia, Crawford, Dane, Fond du Lac, Green Lake, Marquette, Sauk, Sawyer, Washburn, and Waushara counties.

Damage

Periodical cicadas do relatively little harm to established plantings. However, en masse, they can do considerable damage to young orchards, nursery stock and new landscape plantings.

Damage is the result of egg-laying by the females. Egg-laying scars appear as roughened punctures on twigs of many woody plant species. The wounds are one to four inches long; the bark is cut and sapwood splintered and raised to produce a small egg nest. Damage to plants tends to be less severe in mature trees and shrubs due to their larger size. By contrast, injury to nursery stock and new landscape plantings may kill the tree or shrub, or more often, destroy a plant's form when the tender leader shoots are attacked.

Many newly planted landscape trees may escape cicada injury simply because of the history of the area. Most new subdivisions have replaced agricultural land which has been cleared of trees for many decades. Because adult cicadas typically do not travel far, damage to plantings in new developments is unlikely. However, plantings close to woodlots may be at a higher risk of attack.

Cicadas attack over 80 plant species, including oak, hickory, ash, maple, hawthorn, apple, black locust, birch, dogwood, and evergreens. If other hosts are unavailable, cicadas will also attack vines and herbaceous plants. Epinasty, the curvature resulting from more rapid growth on the uninjured side of the branch, and the breakage of the current season's growth are the most common symptoms. Plant varieties vary in their ability to recover.

Description and Life Cycle

The adult periodical cicada has a wedge-shaped body approximately 1 to 1½ inches long, including the wings. Their body is nearly black while the wings have a distinct reddish tinge with a black 'W' near the lower margin of the front wing. They are abundant in late May, June, and very early July. Dog Day cicadas, which appear yearly in late July and August, have a greenish margin to their wings and light markings on their thorax and abdomen.

The male cicada has musical organs located on the sides of the first abdominal segment. Strong muscles rapidly vibrate membranes, producing the cicada's trademark song.

The song of the cicada is actually made up of three separate sounds. The first sound, which occurs early in the season, just after the males have emerged is Pha-r-r-r-a-oh. As the season progresses, the song changes to the loud, shrill, and characteristic tsh-e-e-E-E-E-Ee-oh made by many males singing in concert. The song may last as long as 15 to 30 seconds but is usually five seconds or less in length. Finally, the male cicadas also produce an intermittent clicking or chirping not unlike that of a cricket.

All songs are loudest in hot, dry weather. As the humidity increases, the intensity of the song decreases. During a rainstorm, the song will actually stop until the weather dries. In fact, spraying water at the insects provides temporary relief from the deafening sound produced by the male cicadas.

The emergence of the last nymphal stage during the last week in May marks the beginning of the aboveground portion of the cicada's life cycle. The nymphs burrow directly upward and emerge from the ground, leaving behind a small, round hole one-half inch in diameter. In certain situations, such as shallow soil or saturated ground, immature cicadas may construct clay cones raised two inches above the ground surface where they complete their development.

Once emerged from the soil, cicadas climb the nearest tree, shrub, or post, split the nymphal skin down the back, and emerge as adults. The cicadas remain attached to their supports until their bodies dry and wings harden. The following day the adults take flight, feed, and begin to mate. Although

winged, the insects are relatively stationary and the short flights taken tend to concentrate, rather than scatter, the brood. Feeding injury to trees and shrubs is very slight as only a small amount of sap is removed. By contrast, the female's egg-laying permanently damages woody plants.

Within two weeks of emergence the females begin laying eggs. Each female cicada deposits from 400 to 600 eggs, in groups of 12 to 20, into slits made in the bark. The female cicada favors the tender twigs of one-year-old growth.

In six to seven weeks the eggs hatch, the young fall to the ground and enter the soil for their long subterranean existence. After forming a chamber adjacent to the rootlet, the nymphs penetrate the xylem vessels with their piercing-sucking mouth parts and begin to feed. No apparent damage results from the nymphal feeding. The nymphs remain in the soil for 17 years and only move from their original feeding site under duress. Even then, migration is minimal.

Control

Many reptiles, mammals, and birds, including the English sparrow and robin, as well as predatory insects such as ground beetles and dragonflies attack cicadas. Several parasitic flies and wasps also provide natural control. However, sheer numbers overwhelm these predators so you'll need to protect young plants.

Because of the large number and synchroneous emergence of the cicadas, as well as their meager feeding habits, chemical control provides only minimal success. Prevention, rather than treatment, is a better option.

Prevention

Prevention of cicada injury is aimed at destroying emerged adults. Hand collection to remove and mechanically crush the adults provides adequate protection if there are few plants to protect, such as in most home landscapes.

Covering shrubs with mosquito netting to provide a barrier against the emerging adults may also provide adequate protection on a small scale.

An alternative barrier system is tanglefoot. Place 2- to 3-inch bands of the sticky tape around the trunks of trees to prevent cicadas from reaching the tree canopy and causing damage. By hindering their ability to climb, tanglefoot allows more time for hand removal of the pests before damage is done. Apply tanglefoot carefully, particularly to thin-barked trees such as birch, so as not to damage the bark.

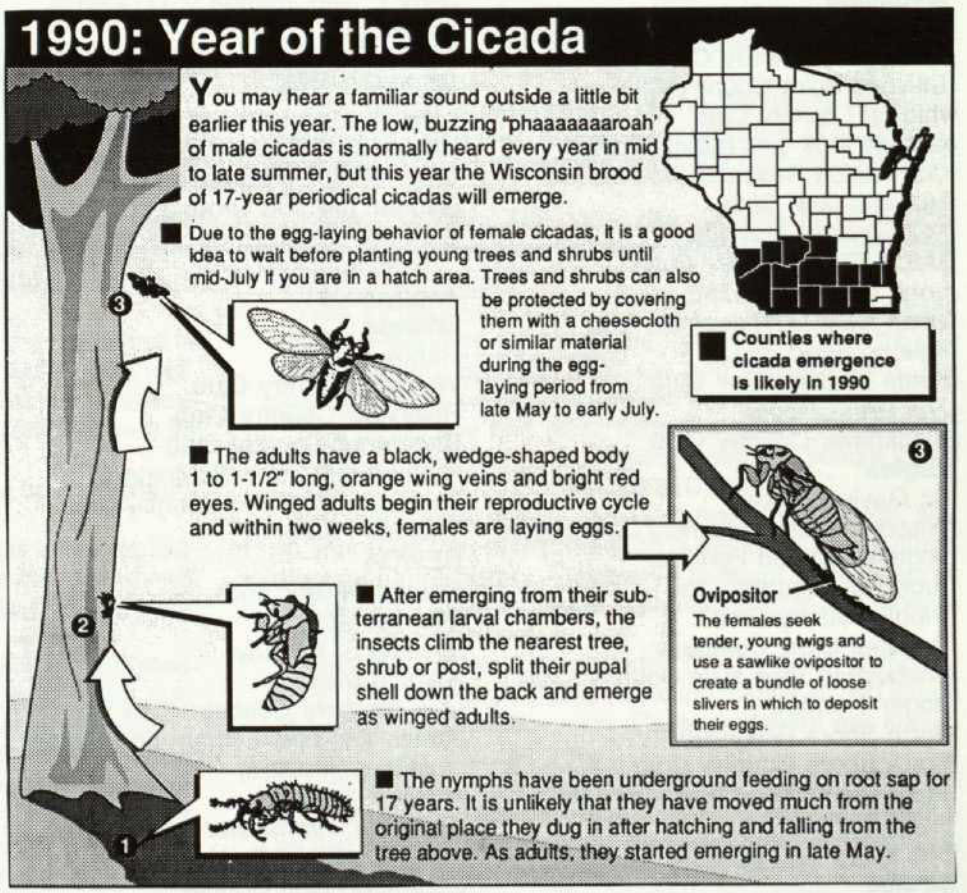
Barriers must be in place when cicadas first emerge and should be left on for at least five weeks, or until all cicada adults have died.

Remove and destroy severely damaged twigs to prevent the eggs from hatching. To minimize overpruning, you may want to forego pruning ornamentals the fall before an emergence.

Chemical Control

In nurseries or orchards with many young trees, chemical control may be of benefit.

Insecticides should only be applied after cicadas have emerged since they must come in direct contact with the chemical. Before using any insecticide, carefully read the label and follow all instructions. Synthetic pyrethroids such as lempo, Yardex, and Pounce are available to professional applicators for control of cicadas. For homeowners, Dursban and Sevin are available. You may need to repeat applications for adequate control. Be sure to follow label directions concerning application frequency. Keep in mind, however, that under severe conditions of heavy migration from wooded areas, even the most effective insecticide may provide little control.



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APOLOGIES TO TOM SCHWAB

Due to an obvious and gross error on the editor's part, I extend apologies to Tom Schwab. For too long I've had him listed wrongly on the NOER CENTER Honor Roll. He should be noted in the "PARS" category of contributors.

Tom has been a tremendous supporter of the NOER CENTER since its first beginnings. Whenever he has an extra $50 or $100, he sends it to the University of Wisconsin Foundation, earmarked for the NOER CENTER fund. My failure was in keeping an accurate total of his donations.

Notice that his club — Monroe Country Club — has donated. So has the PGA professional — Mike Muranyi — at M.C.C.

And Tom, himself, has given more support from his own pocket than over 90 percent of the golf courses in Wisconsin. Nice job, Thomas.

Again, my apologies.

MORE MONEY FROM THE NORTH COUNTRY!

Since our last issue, the NOER CENTER has received some gifts from our friends in the northern districts of Wisconsin. The Northern Great Lakes Golf Course Superintendents Association held a conference at the Oneida Golf and Riding Club in Green Bay last spring. They decided to donate part of the proceeds — $300 — of that meeting to the NOER CENTER. Noteworthy also was the fact that Jim Latham, our USGA Green Section Agronomist, was a speaker at that meeting. He donated a $25 speaker honorarium to the NOER CENTER. Thanks to Jim.

In May, the NOER CENTER fund received a check for $200 from NEWGA — Northeast Wisconsin Golf Association. They are, like the WSGA, a player group. Their recognition, also like the WSGA's, of the importance of turfgrass research to golf, is especially gratifying.

A Letter To CEOs

By Monroe S. Miller

Like most of the letters which appear in the editorial sections of our daily newspapers, this one is being written under the stress of frustration and anger.

What has me upset is the equipment that manufacturers are turning loose in our marketplace. Too much of it is poorly assembled, poorly engineered and even poorly conceived. Some of it's just plain junk. I wonder if the people who run our turfgrass manufacturing companies — the CEOs — have a clue to how many of us feel.

I am becoming weary of dealing with equipment problems. I'm tired of hearing all the excuses, and your companies have the dictionary on those. I am sick and tired of having to buy four aerifiers to keep three running; of having to buy six mowers to keep three on the golf course. I find it incredulous that my new sprayer was a year and two months old before it functioned like it should have when it was delivered.

I've had it with overpriced parts — the morphodite wire size in a throttle cable, for example. "You have to buy the whole assembly," my distributor said.

Frankly, I'm worried about your companies. Despite the good times you're having now, I think you are headed down the same stupid path the American auto industry has been travelling.

When the foreigners decide to get into your business in a substantial way, I'm afraid some of you will be hurt badly. You might even be forced out of business. If you haven't noticed, most overseas companies, especially those from the "J" country, make good products.

There will always be some like me who put a premium on "Made in America".

But believe me when I tell you a whole lot of my colleagues don't care where a piece of iron is made. They will buy the one that works the best or the one that offers the best value.

Even those of us who may remain clinging to your products for whatever reason — nationalism, patriotism, customer loyalty — are going to give up sooner or later.

Here's an example of what happens. I purchased a Pontiac 6000 in 1982. The car was bad news from the day I picked it up (from a very marginal dealer). I ultimately returned to that dealer 23 times for warranty work and repairs. No appointments accepted by the dealer. No loaner car. Sometimes that car was at the dealer for two weeks — no parts. When it was out of warranty, I had to pay the bills — transmission, engine, etc.

I will never own another GM car. Ever. My bitterness remains. Not long ago, GM closed the Framingham, Massachusetts factory where that lousy Pontiac was built. I shouted for joy! "Serves the incompetent bastards right," I said.

How sad. Four thousand Americans out of work because of poor management. GM sold so much junk that a lot of people like me vowed not to buy any more of it. Check and see how their market share in the U.S. has dropped.

Could that ever happen to your company? You bet it could.

Unless you do better. You have to do better. But instead of doing better, I see a lot of short term orientation of your companies. I see underinvestment in solid and creative research and development, and I see the beginnings of merger-mania in your businesses.

You lack innovation in the pieces you're bringing to our marketplace. Worse yet, you lack quality. QUALITY. Quality costs more, but it also wears well. Most of us will pay for QUALITY. We are sick of paying for junk. You need to promote high standards within your companies. Your obvious attitude of "good enough" won't be good enough for much longer.

If you decide to put quality in all the machinery you make (I'll believe that when I see it), then you have to go beyond even that. You must work for complete customer satisfaction.

"Who," you may ask, "does this guy think he is, preaching like this? What does he know? He's probably just some chronic complainer."

Well, I'll tell you who I am. I'm your CUSTOMER, a loyal and long-standing (and suffering) customer. I am the ultimate authority on your business and management. I'm speaking from personal experience.

And I'll tell you one other secret, a secret that doesn't require an MBA from a prestigious business school to figure out: THE CUSTOMER IS KING.

I am very proud of Wisconsin's agricultural heritage, and an important part of that heritage is her strong agricultural manufacturing history. This story I'm about to tell is about one of those manufacturers. The lesson from the story is obvious and powerful.

Jerome Increase Case founded the J.I. Case Company in 1842. Case manufactured threshing machines and steam engines in those earlier years. Case equipment was known for its quality and fair price.

This story proved Case's dedication to fairness and quality. It started in 1884 on a farm near Faribault, Minnesota. By this time, J.I. Case himself was an internationally-known industrialist. A new wooden threshing rig was belted to a traction steam engine. The engine was working well, but they were having trouble with the Case separator. It had just been delivered from the dealer in Faribault. When it was working it consumed too much power and the grain wasn't threshed clean.

The farmer complained to the Case company field representative who rushed out to adjust the machine, but to no avail. The dealer contacted the factory in Racine and they sent out their best troubleshooter.

(Continued on page 19)

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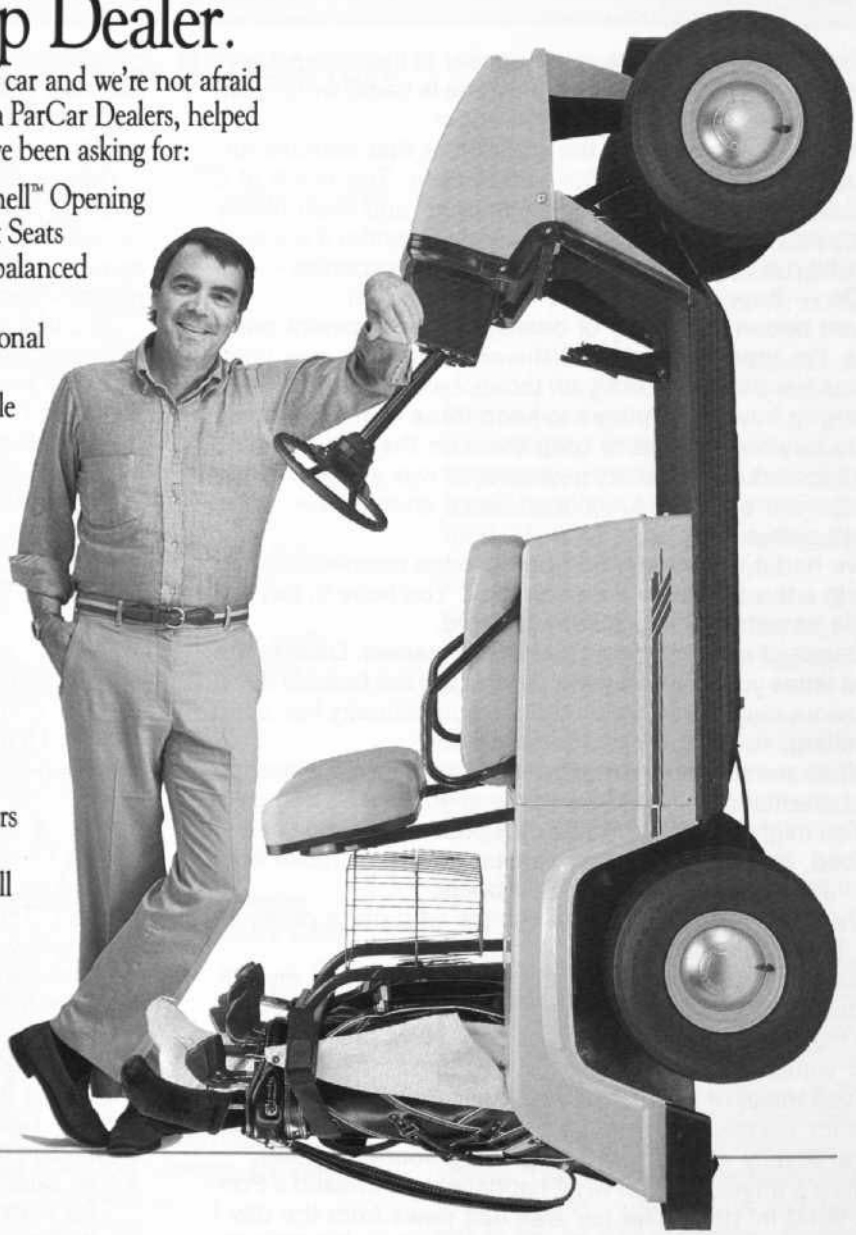

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(Continued from page 17)

He arrived at the farm, worked on the machine, but couldn't make the repair either. He telegraphed the company with this recommendation: "Take the faulty rig back and send the farmer a new one, or refund his money."

The factory agent received an immediate reply: "Am taking next train (stop) Meet me in Faribault (stop) J.I. Case."

Despite his 65 years, the world-famous industrialist was coming to fix the machine himself!

The founder and head of the J.I. Case Threshing Machine Company of Racine, Wisconsin was riding the train across the states of Wisconsin and Minnesota, all so a farmer was assured that Case did not take his responsibilities lightly. All Case threshing machines were warranted over the big, bold signature of J.I. Case himself.

As Case moved from Racine toward Rice County, Minnesota at 20 MPH, he recalled the many years he handled ALL complaints personally, just as he was doing now, by going to the farmers who had the problems. Never had he been unable to repair and adjust even the balkiest machine in all those years.

Word got around the county that old man Case was coming to fix that threshing machine. When his train arrived in Faribault, a substantial crowd had gathered to see the famous J.I. Case.

An hour or so after he arrived at the farm, he ordered the machine started. He fed grain into it for a while and then had it stopped. For the next four hours, as twilight had started to fall, the machine was started and stopped time and time again.

That machine that had defied the dealer and the field representative and the factory troubleshooter now stumped J.I. Case.

Case, his pride hurt, turned to the farmer and asked: "Have you a sizable can of kerosene handy?"

The farmer nodded and brought the kerosene to Case. Without a word he proceeded to douse the threshing machine from one end to the other. Calmly striking a match, he put it to the thresher, lighting the night by the flames of a brand new Case thresher.

Case was filled with anger that a piece of bad workmanship had been permitted to leave his Racine factory. The direct manner with which he resolved the matter was evidence of his commitment to quality. The farmer was delivered a new threshing machine within 24 hours.

Word of the burning spread quickly. His act proved that J.I. Case and his company stood by their product guarantee.

The lessons of quality and integrity and responsibility apparently need to be relearned by far too many of the companies in our turfgrass business. Jerome Case understood that THE CUSTOMER IS KING. Too many golf course superintendents like myself have many pieces of turf equipment deserving of Case's kerosene treatment.

The stakes for you and your companies are high and going higher; competition will be more fierce. Some of you have a big hole to dig yourselves out of. Your work is cut out for you. You'll need to open the doors and windows of your companies and ask questions. Talk to us. Find out what we need. Then build it in the best way possible.

We are in a time of rapid change. The old habits and ways of doing things aren't going to get you much farther. Work on your strengths and attack your obvious weaknesses. Hire the engineers who can do the job. Be tough-minded in your planning and ambitious in your goals.

We want you to succeed. We are counting on you. Please don't let us down. Show us you subscribe to the philosophy held so tightly by Jerome I. Case over 100 years ago.

TURF'S UP.

There's tough mowing ahead! City parks, back yards, baseball diamonds, municipal sites, golf courses–to name a few.

The whole nine yards!

Through it all, tough Magnum and Command engines keep clipping right along.

Kohler's high torque rise cuts jobs down to size in no time, flat.

For power that can cut it, at any angle, Kohler verticals are equipped with full pressure lubrication and full-flow oil filtration. And to protect your engine from low oil conditions, there's optional Oil Sentry.™

Kohler engines. Built for a hard day's work.

Plus, with genuine Kohler parts, a strong dealer network and a two year industrial strength warranty, Kohler engines keep your customers on the cutting edge of their field.

For more information about Kohler Magnum and Command engines write Kohler Co., Engine Division, Kohler, Wisconsin 53044. Or call 414-457-4441.

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