The Florida Green

WINTER 1981

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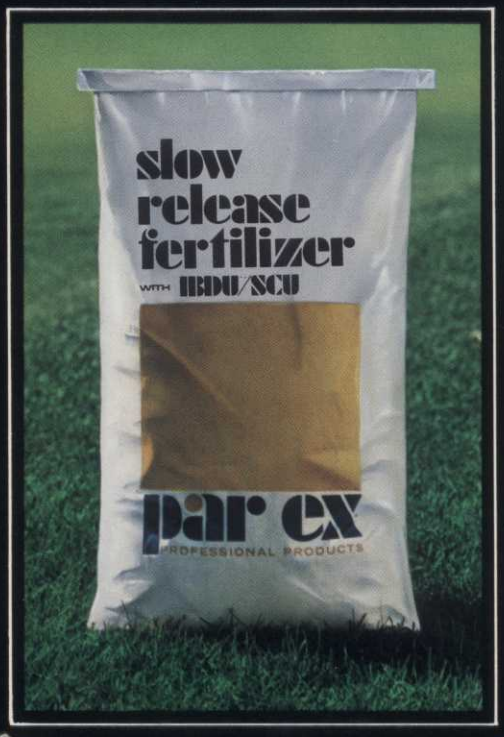

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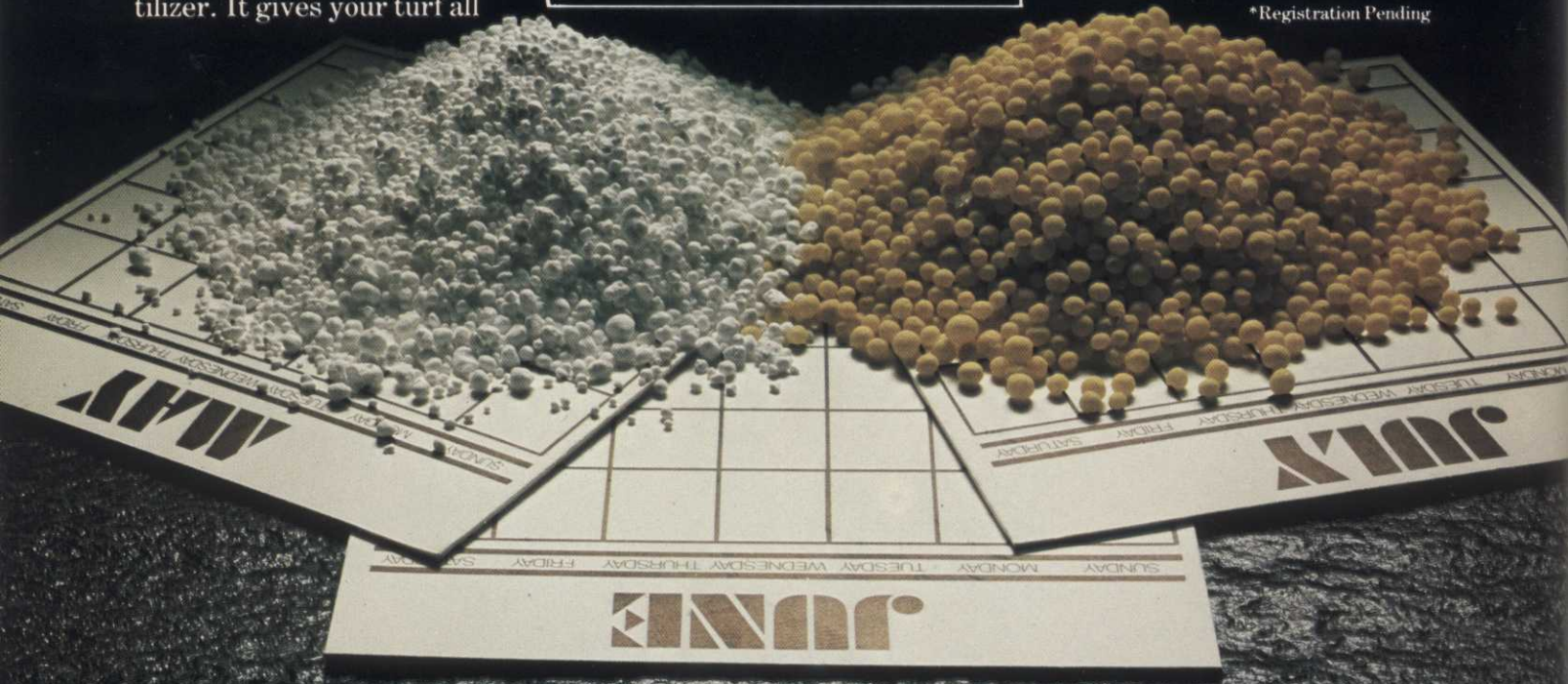

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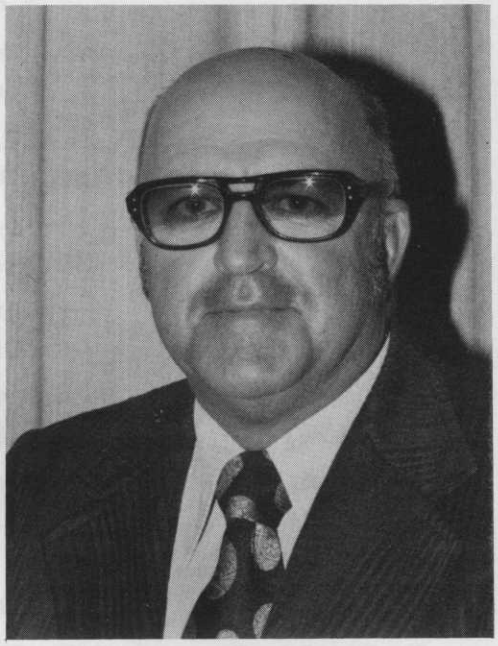
President's Message



As the new President of the Florida Golf Course Superintendents' Association, I welcome the distinct pleasure of addressing my colleagues through this message. Please accept my comments constructively, not critically.

Undoubtedly the results of a whipping can be considered controversial. Many times in a horse race the jockey is accused of using the whip too much or too little. I trust you can stand one more exhortation on the need to join an organization and possibly transform the power of that whip from a device of punishment to one of attention and identification.

I am not a true believer in becoming part of an organization just to be another name on the roster, but we are playing an important numbers game. Without a doubt, the legislature, manufacturers, environmentalists, or any controlling or regulatory group will listen to 1,000 voices more intently than 10. The performance has been chosen, the stage has been set, now it is time for the cast to act — you and I individually and collectively. It is up to ALL of us to join forces — stand up and be counted. You supposedly have chosen the turf industry for good reasons. Now support it. Become an active part of your livelihood. Invest in your present and future.

Join your local Superintendents' Association and expose yourself to "grass roots" education — what is being done in your backyard. As part of the state association you contribute, through numbers, to the sting of the whip. Lend a "Big Brother" hand to the turf industry at large by joining forces through the Florida Turf Grass Association. And as a member of G.C.S.A.A. you collectively impart support to and have an impact on Federal decisions concerning matters which effect our environmentally oriented business.

I believe all of us can afford the dues even, if necessary, out of own pocket. Perhaps it is difficult to see or feel a direct "in the hand" benefit of these investments — but they are worthwhile and your future depends on your present action.

You are important. We need you even if you think you don't need us. Become an active member of the mentioned associations.

Bill Wagner

The Florida Green

The Official Bulletin of the Florida Golf Course Superintendents Association
Florida Green Phone: Days — (305) 793-0069

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ABOUT OUR COVER

Severe infestation of sodweb worms on a green. Picture was taken after application of primicid at two quarts per acre.

Dan Jones, C.G.C.S., Editor
Banyan Golf Club

Dave Baily
Atlantis Country Club
Associate Editor

OUR BIGGEST ADVANTAGE IS HOW LONG A SINGLE APPLICATION WILL CONTROL CRABGRASS, GOOSEGRASS, BULLGRASS AND SANDBUR.

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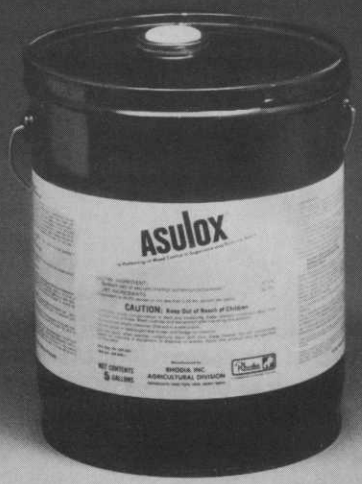


The once-a-season herbicide.

Superbugs:

A New Biblical Plague?

By Michael Satchell

The battle erupts in Texas. After years of being under control, a generation of insects begins multiplying in fantastic numbers — suddenly unaffected by the chemical weapons that have kept them in check. Farmers get panicky, some spraying their fields as many as 50 times with powerful insecticides, but it has little effect.

After devouring much of the Texas cotton crop, the insects march into northern Mexico, gobbling up a million more acres of cotton, wiping out an entire industry, and leaving the land wasted and barren.

Newer and more exotic poisons are thrown at them but serve only to slow the insects down. After shaking off the new assault, the voracious hordes regroup and sweep into Louisiana, eating a quarter of that state's cotton crop. Temporarily sated, they head west to California, bringing terror to the lush Imperial Valley, America's vegetable bowl.

Here, the crawling, wriggling juggernaut begins by chomping its way through some 5 billion pounds of lettuce — three quarters of the nation's crop. All seems lost until a last-ditch defense with another new poison thwarts the assault. America's salad bowls are safe this year, but the victory may be only temporary. Where will the monster bugs strike next?

This may sound like the scenario of a Hollywood horror movie, but the saga of the budworm (which is equally happy eating tobacco, cotton, lettuce and tomatoes — plus DDT, toxaphene, methyl parathion and other powerful insecticides) is very real. Last winter's California lettuce crop was saved only after authorities agreed to the emergency use of a highly toxic and largely untested pyrethroid chemical. In time, scientists believe, the budworm will develop immunity to this poison too.

The budworm is just one of 364 so-called "superbugs" worldwide that have developed resistance to the witches' cauldron of poisons used to destroy them or keep them in check. They are the shock troops of a global insect army locked in constant combat wth man, challenging us for our food and fiber supplies and bringing death, disease and discomfort to millions, particularly in Asia, Africa and Latin America.

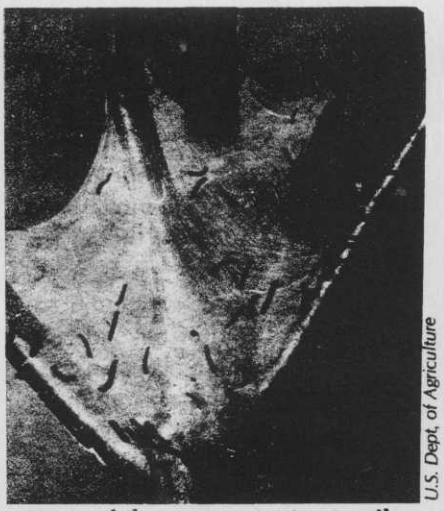
Viewed in terms of war, it is the insects that are on the offensive. "They are beginning to tip the scales in their favor," warns Dr. Paul Schwartz, a U.S. Department of Agriculture (USDA) entomologist. "The potential for disaster is always present — in agriculture or in disease."

The United Nations Environment Program, in its recent

(Continued on Page 7)

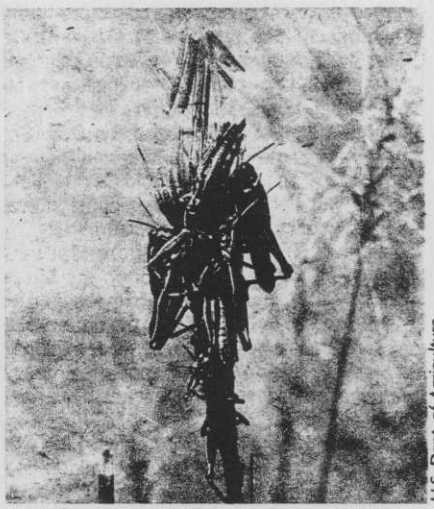
U.S. Dept. of Agriculture

Fire ants eagerly feeding on unopened flower bud of okra.



U.S. Dept. of Agriculture

Nests of the eastern tent caterpillar. Note the layers of silk.



U.S. Dept. of Agriculture

Grasshoppers are shown chomping away on a half-devoured stalk.

State of the World report, noted with alarm the rapid gains made by insects, mites, ticks, rodents, weeds and fungi in becoming increasingly resistant to pesticides. This poses a grave threat to world health and food production.

Of the 364 superbugs, 223 are agricultural pests that attack crops in the fields or after the harvest. The remaining 141 spread disease to livestock or humans — flies, ticks, cockroaches, lice and mosquitoes.

In the last two years, the U.S. has been invaded by exploding populations of pests. Plagues of grasshoppers almost Biblical in size have blanketed and denuded millions of acres of crop and range lands in 14 states west of the Missouri River.

In Maine, millions — perhaps billions — of tent caterpillars have been defoliating trees and invading homes. Gypsy moths have stripped half a million acres of Pennsylvania forest and are spreading south into the Blue Ridge Mountains. Colorado is losing 2 million Ponderosa pines each year on the eastern slopes of the Rockies due to pine beetle infestation. Elsewhere, record numbers of borers, rootworms, bollworms, cutworms, webworms, hoppers, miners, loopers, beetles and weevils are decimating crops, making life miserable for farmers and homeowners, and causing millions of dollars in losses.

Overseas, the effects on food supplies and public health are even more drastic as the insect hordes gather momentum. Locusts — bigger and more voracious cousins of the grasshopper — have swarmed across Africa and parts of Asia, eating everything from crops to wooden fence posts. Increasing resistance to insecticides is being shown by major pests that attack crops on which entire agricultural economies are based — rice in Japan, coconuts in tropical Africa, cattle in Australia, cereals everywhere.

The World Health Organization (WHO) has charted an alarming rise in malaria after seeing the disease dramatically reduced in recent years by effective new insecticides. But the mosquitoes have been highly successful in blunting these attacks by developing immunity. So far, 43 species that carry malaria — plus 41 species that transmit dengue, yellow fever and a host of dread tropical diseases — have developed resistance.

This country also faces a constant threat from mosquito-borne disease. Without expensive, continuing control programs, coastal areas of Florida and some Southern states would be uninhabitable. Dr. Donald Weidhaas, director of a USDA research laboratory in Gainesville, Fla., worries about the increasing resistance trend.

"We're lucky we can afford these expensive methods to combat the problem. The developing countries cannot," he says. "The potential is here for malaria and encephalitis; already we're seeing dengue and yellow fever turn up in Caribbean countries."

Changes in climate, different methods of agriculture and the banning of certain insecticides for environmental reasons are all contributing to the burgeoning insect populations. But resistance to chemicals — our first line of attack and defense — is the major and most worrisome reason.

Compared to millions of years of gradual evolution and adaptability, the changes insects have undergone in becoming resistant to man's chemical poisons have taken place with fearful speed.

The first case of resistance was noted in 1908 when fruit farmers in Washington State found that a tiny pest called the San Jose scale could no longer be controlled by lime sulfur. For the next 30 years, a dozen more insects developed resistance to various pesticides produced from naturally occurring organic substances.

After World War II, the chemical industry began manufacturing synthetic pesticides, and they brought amazing changes in the fields. Farmers applying these new "miracle" chemicals sometimes harvested twice as many crops as before and exulted in the "green revolution." It appeared that man had at last found the answer to controlling his insect foes, and for a while we had the upper hand over the pests.

But it wasn't to last. Many of the most effective pesticides were found to cause serious environmental problems. Rachel Carson's book *Silent Spring*, detailing the disasterous effects of DDT, sounded the first major warning note. Eventually, such compounds as DDT, Chlordane, Aldrin, Dieldrin and Heptachlor were banned or their use severely restricted.

(Continued on Page 8)

The chemical onslaught also threw the biological balance out of kilter. The pesticides killed both the target bugs and the beneficial parasites and predators that helped keep them in check.

But most important of all was the growing trend to immunity. In 1957, researchers counted 76 species of bugs resistant to the new poisons. Ten years later, the number rose to 228 species. Today, the 364 resistant insects are immune to the effects of some 60 different poisons, and some insects have multiple resistance — born with the ability to withstand attack from as many as a dozen different chemicals.

As insects became more difficult to control, farmers began pouring more and more insecticides into their fields, killing increasing numbers of beneficial insects — along with birds, fish and small mammals — and pushing the poisons higher up the food chain.

When one insecticide became useless, the industry simply created a new one; and when insects developed immunity to that, still another one was introduced. This expensive and rather insidious trend has reached the point where American farmers now spread 1 billion pounds of pesticide on their crops each year at a cost of $2 a pound. And in these times of oil shortage, costs will certainly leap, because 80 percent of synthetic pesticides are made from a petroleum base.

The heavy dependence on pesticides has locked us on a chemical treadmill, and the strategy has been a "debacle" in the view of the late Dr. Robert van den Bosch, University of California entomologist. "It is questionable," he said, "whether we have made gains against the pests since the mid-1940s. And, in fact, with insects there is evidence we have lost ground."

Agriculture, realizing the biological errors of its old ways, today is moving to switch strategy to control pests by combining methods as old as farming itself with exotic new technology and the limited, careful use of pesticides.

These include crop rotation — growing different things each year instead of the same food or fiber that allows insects to become established generation after generation by feeding on a favored crop.

There is the biological warfare approach — breeding and introducing predator insects into the fields to feed on these agricultural pests/parasites.

The most fascinating development, however, is still in the highly experimental state: the use of pheromones — chemicals produced in the laboratory that duplicate the sexual lure substances of the insects.

These sex excitants can be used to entice insects into traps or to disrupt their mating habits. In some tests, scientists have flooded fields or orchards with a pheromone, making it impossible for males to locate the females.

In others, tiny amounts of the sex lure are spread in thin plastic tubes. "The males are attracted to the tubes and spent their time trying to mate with the plastic instead of the female," chuckled one government scientist. "It must get pretty frustrating."

Similar methods are being tested for pests that bother humans, though introducing predator insects into an apartment building plagued with cockroaches is hardly feasible. Entomologists advise that the best method of combating insects and rodents around the house remains a simple one: don't leave garbage about.

Despite all the modern weapons at our disposal in the continuing conflict with insects, this country still loses 30 to 40 percent of its food and fiber supplies to pests. On a global scale, almost half of the world's crops are eaten or destroyed by rodents, bugs and weeds. Since insects outnumber use and are far more adaptable and theoretically able to breed resistance to any kind of poison that we can invent, the end result of our age-old battle with them is inevitable.

Superbugs and superpests will eventually take over the earth, just like in some Hollywood movie. A disturbing thought, but hardly something to worry about in our lifetime — unless, perhaps, the budworm eats its way out of America's farmlands and starts showing up alongside the cockroach in our cupboards and kitchens.

USGA Regional Meeting

The United States Golf Association, Green Section, Southeastern Region will hold their next regional meeting Monday, February 23, 1981 at the Holiday Inn-Lakeside, Boca Raton. The motel is immediately west of the Boca Raton exit from the Florida Turnpike. Plan to attend this all day session. South Florida Chapter and Palm Beach Chapter will not hold February meetings because of this event. Registration fee is $15 which includes lunch.

A wide range of subjects will interest golf management people of all levels. To be discussed in the morning session are the USGA and its role in the game of golf. Other subjects are golf etiquette, trends in golf facilities, integrated pest management — weed control, performance — evaluation of Bermauda species, the manager's role with the golf course. The afternoon session subjects are: importance of course housekeeping, coping with traffic, vandalism, bermuda green mutation in the superintendent management program and conditioning the course for play. The afternoon session highlight will be a rare appearance by cytogeneticist Dr. Wayne Hanna of the Tifton Georgia Coastal Plain Experiment Station. His topic will be contamination in greens — the Pee Dee Syndrome.

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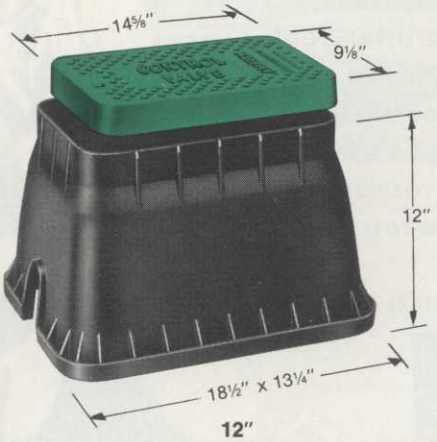

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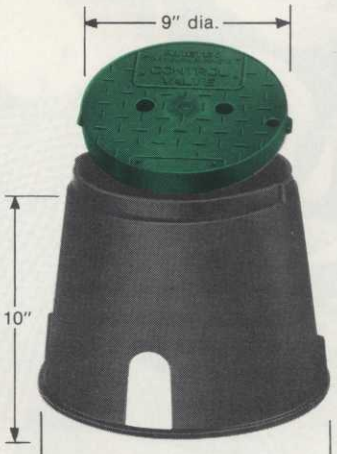

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NORTHRUP KING®

Mr. Superintendent – Are You An "Endangered Species"?

By STAN FREDERIKSEN
Manager — Turf Products
Mallinckrodt, Inc.
St. Louis, Mo.

Mr. Golf Course Superintendent — is your future as a career turf manager "clouded"? Perhaps much more than you think. Let's take a look at some very ominous considerations you will have to face in the very near future.

Back in the early '60's, Miss Rachel Carson's book *Silent Spring* was published. It had an everlasting impact upon the world of growing things, including your "thing," highly maintained fine turf. Undoubtedly its original purpose was a truly noble one — to focus public attention upon the indiscriminate use of chemical pesticides and the adverse effect this could have on man and his world, not to mention the Earth's millions of other living inhabitants.

However, the overreaction by federal, state and local government officials was startling. Federal agencies, armed with powers delegated to them by Congress, began removing from the marketplace pesticides they found had caused some kind of harm, either to people or the "environment." They also began removing pesticides they felt "might," even under the remotest possible circumstances cause some sort of problem, whether there had ever been such problem reported in connection with those pesticides or not. Further, the "possibility" of potential harm was not limited to that associated with people. The new phrases "balance of nature" and "endangered species" and others began to appear. One group or another began worrying whether in the next 15 or 20 years the "purple-crested-thing-a-ma-bob" would become extinct because of the impact in the "environment" of chemical pesticides. Strangely enough, some of these groups paid little attention to the very basic question — "Should the world be made safe and adaptable for people? — or for 'endangered species'?"

Let's make some observations as to what has happened since *Silent Spring* to bring us to where we are at present, with respect to pesticides and their use.

1. Gone from the market place are many of the important pesticides that helped farmers grow plentiful good crops that you could buy inexpensively. The same pesticides helped you grow beautiful fine turf. Few of these ever caused problems, but (found some government agencies), they "just might" cause problems, and so they were banned.

2. Gone is the incentive on the part of the chemical companies to develop new pesticides to help your career. Why should they? There's now only one chance in several thousand that any new compound could ever become commercially available as a pesticide.

3. Gone is the source of many of your turf pesticides — that source being pesticides originally researched and developed for food crops. Because turf is such a small segment of the agriculture market, very few, if any, companies would ever embark on a program of research to develop a pesticide just for turf when the chance for its commercial success is so slim. With pesticides for food crops in jeopardy, you can imagine how remote is the possibility of new pesticides for turf.

4. Just after *Silent Spring* appeared, the food pesticides people found their warehouses filled with pesticide compounds that the government had banned for food crop use. When a magazine writer said that, "A $14 million market has opened up for fungicides on golf course turf," you can bet the food pesticides manufacturers started moving their erstwhile unsaleable (for food crop use) fungicides over into the turf market, rightly reasoning that "very few people eat grass." It was at this time (mid 1960's) that you saw entry into the turf fungicides markets, by firms which had never participated in such markets before.

5. Right after *"Silent Spring,"* Monsanto published a resounding rebuttal to the book. To discover what the world would be like without pesticides, read the October, 1962 issue of *Monsanto Magazine* article entitled "The Desolate Year." It depicts a world without pesticides, overrun with insects and other pests, and presents a frightening picture of how tenuous is the thread that holds civilization together. Without pesticides, the human race could literally be eliminated. The grim fact is that all the pesticides we've ever had could only hold antagonistic pests in check. In no way could all of them be eliminated. Witness even today in your continuing battle against turf pests how many insects and fungi have already adapted to pesticides and/or have become entirely resistant to many of them. To reinforce yourself on this particular point, be sure to see the motion picture "The Helstrom

(Continued on Page 16)

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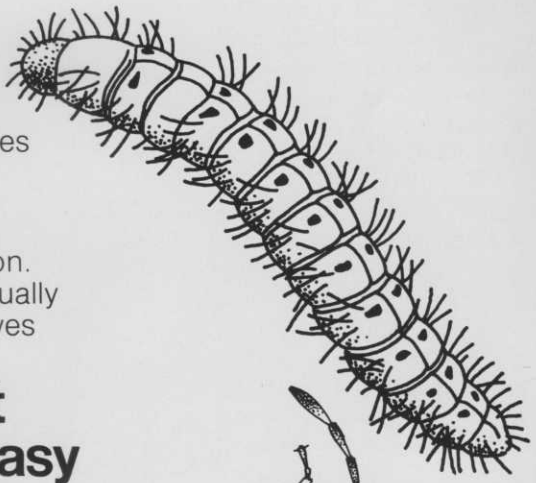
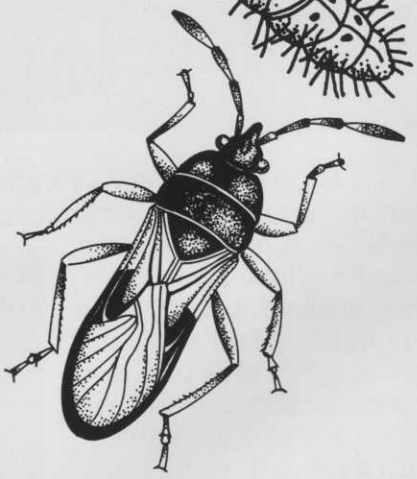
...reliable, long-lasting control for even second generation sod webworms and chinch bugs.

Simplify turf and lawn care problems for your customers and for yourself by using Primicid insecticide. It gives effective, dependable, long-lasting control of sod webworms and chinch bugs.



Primicid works by contact and ingestion. Residual action is so good that one application usually controls two generations of sod webworm and gives lasting control of chinch bugs.

Primicid is powerful against these insect pests but it's easy on turf and beneficial insects such as earthworms. Use Primicid without damage to grasses such as Bermuda, St. Augustine, blue and fescue grasses. Follow label directions carefully. It's registered in Florida on a "special local need" label for use on turf. Primicid is a product of ICI Americas Inc., Agricultural Chemicals Division, Wilmington, DE 19897. See your Primicid supplier or your ICI Americas representative now.



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Palm Beach Pesticide Report

The last issue of this publication had an excellent article by Dr. Roy A. Bair, "Jimmy Blackledge Motivated Turfgrass Research in Florida," a fitting tribute to early pioneers of our industry. Numerous superintendents with courses built in the 1960's were amused by the closing comments "one regret" about Ormond Bermuda — it was released!

The comment referred to the disadvantage of its vitality and invasion from green slopes to putting surface. Many superintendents rate Ormond Bermuda's mite problem as its main drawback. Was this year's mite attack the worst on record? Is this a different mite than in the early 1970's? Is this a mite at all? These questions are asked when several "Ormond" superintendents get together.

Carl McKinney, superintendent of the prestigious JDM Country Club, says, "The mite problem was the worst we have had in the 17 years I have been at this club. We used many different chemicals with little success. We even did one fairway in test plots with different materials, rates, and just topdressing with no true conclusion."

All superintendents with the problem report the mites peaked in late August and early September at a critical time. Herbicide programs with Sencor emphasis were drawing to a successful close at the time of the mite invasion. Thus stressed turf areas were devastated and the final outcome was a larger weed population than before the program started. One fertilizer salesman referred to his September orders as "mite food".

Atlantis Country Club superintendent David Bailey said, "I do not see the same early symptoms of mites as I noticed five or six years ago. The witchbroom effect where the grass curls into a clump was not there this year. I challenge the university for a cure and if the species are the same as before. Now the only early sign is a yellow chloric color and in 24 hours it is past tense. When we saw the old witchbroom effect we had some reaction lead time and a fifty-fifty positive result, but not now. We applied four different products with little positive result. The mites drank the Diazinon Ag 500 and little was achieved with Furadan by FMC. More results were visible with Vydate L a DuPont product and best results were achieved with liquid Nemacur."

None of the Palm Beach superintendents with the mite problem like to think of it on a dollar basis since inflation already ruined the budgets. But a general answer ranges from $6,000 to $9,000 per 18 holes for the chemicals and additional fertilizer. That does not include labor costs. As one superintendent said, when people pay a quarter million dollars or more for a lot and home overlooking the golf course they want results only. People do not know or care why you do not have Tifway 419, a more mite resistant turf. If you have Ormand count on some hand weeding and spot fertilizing at any cost.

The past herbicide season saw great results with Sencor, a product of Mobay Chemical Company. Weed populations of goosegrass and crowfoot are under control for the first time. One wonders why Dupont Chemical Company which also researched the active ingredient of Sencor does not enter the market. A little "competitive pressure would be welcomed! Sencor will be remembered as "the chemical of the 70's." Used in rates of 1/4 pound per acre with MSMA at 1-2 quarts per acre, it produced excellent results. Several applications are needed at weekly to 10 day intervals. Two and three generations of weeds will appear. Again the Tifway 419 courses have a tremendous advantage because of their growth density. Ormond and Common Bermuda applications must be done with extreme care.

New courses grassed in Tifway 419 were able to open in a clean weedfree condition. Under the heavy fertilizer rates of the growing-in process, control was achieved with nearly no bermuda discoloration. Basagram by BASF has been very popular on sedges. Label rates have been slightly increased with good control at your own risk.

Fungicide programs are at a peak right now. Superintendents with overseeded courses are keeping a watchful eye for pythium. Koban, the most popular treatment, is being joined by other economical controls with Terrazole and Demosan. Most rye overseeded greens have Koban treated seed, a wise investment for the additional nickle per pound seed price. Courses overseeded with Penncross Bent are applying phythium control measures to the soil with Dexon and Lesan and then normal control after germination. The more expensive phythium control of bent grass overseed is the reason many courses do not use this superior putting turfgrass. Said one superintendent, do not plan to overseed with bent in the Palm Beaches and take any weekend trips.

Rumor has reached the Palm Beaches of west coast courses using an unusual economical method for control of black algae. It's good old Clorox at one gallon per acre. Now stop, before you rush to Publix grocery for this 90-cent per acre control. You know what it does to your jeans! What is the long term effect on your soil and root system? Remember the bottom line is not going to be 90-cent per acre control unless you and your club are equal to the control cost.

Chronicle," which shows that practically all insects can adapt to just about any pesticide — and that it may not be too far in the future when insects, not humans, will rule the world! That is, unless mankind can continue its pressure on the pest world through much more pesticide research and a constant flow to the marketplace of more new pesticides.

6. Is pesticide research dead? Maybe not quite, but it's rapidly approaching that state. Dr. John Shred, the famous Connecticut entomologist, told me at a turf conference a couple of years ago that at that time of the year just 12 months before he had, in the first quarter of the year, screened hundreds of chemical comnpounds for insect control activity. During the current quarter, he told me he'd received candidate insecticide compounds from only two companies.

7. Over-reaction has also shown up at the state and local levels. More and more states, because of pressure from environmentalist groups, are placing their own bans on many pesticides, whether there's any real basis for such action or not, and they are imposing almost intolerable regulations and conditions. An example is California where anyone who even recommends the use of a pesticide must have a permit or license. In the original legislation, a license was needed not only for the state itself, but also for every county of the state in which that pesticide was to be sold and/or recommendations for its use made! It's just about enough to turn off anyone and let the pests take over by default.

8. Another part of the untenable present pesticide situation is the practically impossible maze of registration procedures. Whereas formerly a good pesticide could attain registration in a few weeks, it may now require years — and lots of money. New obstacles have been thrown up, including such things as "feeding studies," "residue studies," "environmental impact studies" and the like. Some companies have received pesticide applications back from the EPA no less than five or six times for "more data" the "dotting of i's," "the crossing of T's," etc. Do you wonder about the increasing prices of pesticides? You shouldn't when you begin to realize the tremendous costs involved just in registration, including the horrendous work involved, the numerous trips to Washington, etc.

9. The crunching halt to pesticide research was mentioned earlier. The true extent of this literally jumps at you when you hear that many companies are completely abolishing their pesticide research facilities and terminating their people. Many experiment stations, formerly strong in agricultural and turf pesticide research, have either cut back or eliminated this from their programs.

10. Again, a persistent reason given for removing long-standing well-and-safely used pesticides from the market is that they "might" (not *"will"*) result in malignancies or "get into the food chain" (another favorite phrase of the environmentalists), or otherwise

(Continued on Page 17)

adversely affect the "ecological balance." It's likely true that indiscriminate airplane spraying of toxic substances over wide areas could pose health problems. But this is far different (for instance) from a qualified turf manager spraying a few ounces of a mercurial fungicide on a tiny (relatively, in area) putting green, where there's *proof* that it can only move *downward* (never laterally), and will tie up into insoluble and therefore innocuous soil compounds that can never contaminate or pollute.

So-o-o-o — Where does all this leave us? Some obvious conclusions:

1. Expect to see very few new pesticides in the foreseeable future.

2. Be ready to get by with far fewer pesticides than you've ever had before. You'll have to take what you can get, and be satisfed. It won't matter that what's available to you just might not work.

3. Watch for alternate methods of pest control. Close at hand may be the era of biological controls — or even the control of pests with sophisticated electronic devices not yet even dreamed of.

4. Pests could increase their activity to where, perhaps, intolerable conditions for the public may force changes in government thinking to the point where the bureaucrats will really have to decide whether to control pests or choose the only other alternative and let the pests overwhelm the people.

If the average turf manager must choose between eliminating some of the management "tools" he now has to work with, it has been determined that the very last thing he'll give up is his store of good pesticides. He simply cannot maintain fine turf, especially putting greens, without good pesticides — at least as of now.

What's to be done? That's mostly up to you. You can either endure the restrictions and regulations, or you can do something about it! Write to your Congressman! Write to your Senator! Work through your association and its fine membership, and let the government know that its actions are jeopardizing **your** career. In order to manage fine turf properly you need good tools — **especially good pesticides!** Just because something "might," at a future time, cause a problem is no reason to ban it if it has never caused a problem before. Mercurial fungicides are a good example. For over 50 years — one-fourth the entire history of the United States — mercurial fungicides have served golf course superintendents well. They are without peer in performance and low in cost-in-use. In all those 50 years there has never been a documented case of injury with these materials when used as directed. And yet there is the threat of a denial of registration of these mercurials. Why? No one really knows. It happens that a number of routine items of commerce, readily available over-the-counter to anyone of any age appear to be far more dangerous than mercurial turf fungicides, used as per their labels. It has been said, for example, that **ordinary aspirin causes**

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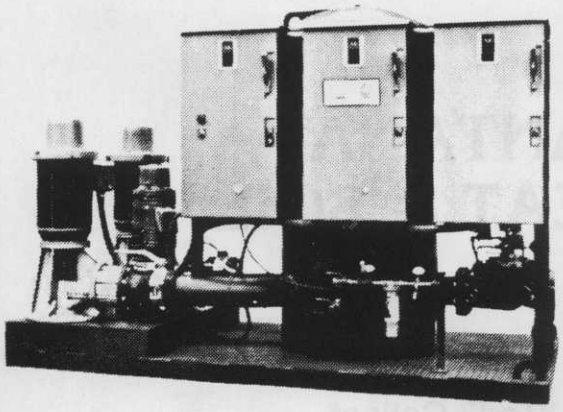

more deaths every year than all pesticides combined — of any type — and designed for whatever purpose!

What man can do to pollute the Earth is infintesimal compared to what the Earth does to itself. A recent article claimed that when Mount Krakatoa, the volcano, exploded and sank into the Pacific back in the 1880s, that single explosion threw into the atmosphere more pariculate pollutants than has all of Mankind since the world began! By the way, the title of the article is, "The Earth Is Its Own Worst Polluter."

Why is it that you are the key to the future of good pesticides? Because you are the only one government officials will listen to — because you are the one most adversely affected when important pesticides are no more. Thus it is imperative that you let your voice be heard — individually and through your associations. If you don't it might just be *you, the Golf Course Superintendent* who becomes the endangered species.

Electric Charge Boosts Pesticide Application Effectiveness

Dr. S. Edward Law, Agricultural Research Engineer of the University of Georgia, has developed a new system for pesticide applications. Under sponsorship of the University of Georgia and Cotton, Inc., Dr. Law electrically charges pesticide spray droplets which are then attracted to the plant leaf surface. The system can cut pesticide consumption by one-half at a saving of $1 billion annually for the American farmer. The USGA Research and Education Fund is supporting Dr. Law's work as it relates to turfgrass applications.

When spraying pesticides, compressed air is used from a spray-charging nozzle to propel the electrically charged droplets toward the plant. A negative charge is usually used. As the charged cloud approaches the crop, the constraint to remain at ground voltage induces into the crop an opposite charge to that of the cloud. Thus, the negative particles are drawn down to the plants.

"Of special importance," says Dr. Law, "is the fact that not only is more pesticide deposited on the plants, but it is distributed more evenly." This means less pesticide will be needed for control and low volume spray applications will be ideal.

U.S. Patent rights were granted in January, 1977 and foreign patent applications are already filed. The equipment will be relatively inexpensive and will utilize a solid state power supply that can be run off a tractor battery. Since conventional pesticide applicators usually put only 20 percent of the material onto the target plants, Dr. Law's new technique expands agricultural scientific horizons once more.

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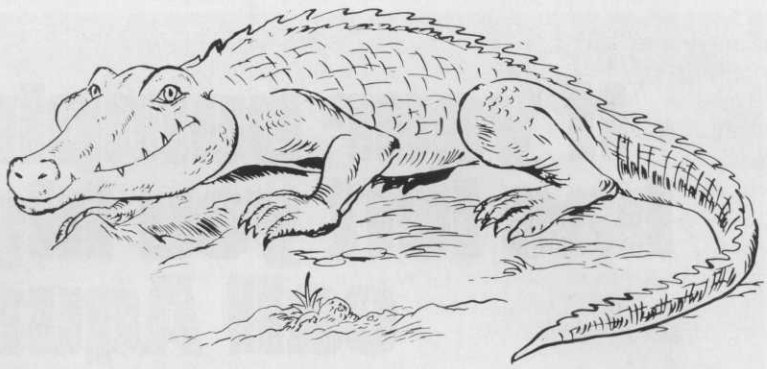

By DALE WALTERS

This is a composite report from several golf courses in southwest Florida concerning which pesticides are in use, why they are used, and problems that have been encountered.

The weather that southwest Florida experiences no doubt has a great effect upon our disease and insect problems. We have warm weather from mid-March through mid-November and the average rainfall is about 60 inches per year. Most of the rainfall comes in the months of June through September and hot, humid weather is common throughout the summer months.

The following insecticides are in general use for our area: Diazinon, Dursban, Toxaphene, Lannate, Malathion, Baygon, Temik, Mocap, Dyfonate, Sevin, Cygon, Lindane and Dansanit.

Diazinon, Dursban and Lannate seem to be the most used insecticides because they give good control of sod webworms and armyworms which are the major insect problem on greens. Lannate probably has proven to be the best for length of residual control. Sevin and Toxaphene are economical to use but residual is reduced with Sevin and Toxaphene has shown some phytotoxicity. It is necessary to alternate the use of insecticides because the sod webworms and armyworms can build up some immunity. There is also a problem with odor from many of the insecticides which usually takes a couple of days to disappear. Bait forms of several of the insecticides as well as sprays are used for control of mole crickets but none give good control. Insecticides are extremely hazardous and need to be handled with care to protect both the applicator and those on the golf course.

The following nematicides have been in general use for our area: Ethylene Dibromide (EDP), Nemagon (DBCP), Nemacur and Dasanit.

Injection of EDP and DBCP have given good control of nematodes; however, DBCP is no longer available. EDP not only gives control of nematodes but is very effective in controlling mole crickets. Nemacur and Dasanit are excellent for reducing nematodes and their application is very easy, but extreme care is necessary in handling these chemicals.

The following fungicides are in general use for our area: Daconil 2787, Dithane M-45, Fore, Captan Kromad, Thiram, Tersan SP, Demosan, Truban, Koban, Benlate, Tersan 1991, Form-A-Turf, Tersan LSR, Dexon.

Several of the listed fungicides are the same as others listed having only different trade names. Daconil 2787 is a highly used fungicide for broad spectrum use and is available in the flowable form which is much easier to handle than the powder and the flowable is better for the sprayer pumps and nozzles. Dithane M-45 and Fore are good broad spectrum fungicides. Form-A-Turf can be phytotoxic but it is inexpensive and seemingly promotes root growth. Thiram and Captan have given control of brown patch but need to be used at higher rates than many other fungicides. Benlate or Tersan 1991 also have given good control of brown patch and dollar sport. Tersan SP, Koban, Truban and Demosan have shown good control of pythium while Dexon did not do as well. Care should be used in handling and applying fungicides as they are hazardous. The eyes need to be protected from spray drift because they are sensitive to many fungicides.

The following herbicides are in general use for our area: MSMA, 2,4-D, Sencor, Buctril, Asulox, Parquat, Kerb, Round-up, Basagran, Trimec, Balan and Dowpon C.

MSMA seems to be the safest broad spectrum herbicide to use on bermudagrass; however, it does not give control of some weeds that we need to eliminate such as goosegrass or crowfoot. 2,4-D gives good control of most broadleaf weeds but it can stunt the bermudagrass. Sencor works well in areas that aren't shaded but slight misapplication can be trouble. Asulox works well on the crowfoot but it takes about six weeks in action and it can burn if the rate is too high. Buctril works well on many broadleaf weeds and has little effect on the bermudagrass. Trimec is another good herbicide to use for a broad spectrum of boardleaf weeds. Basagran, with one or two applications, has excellent control of sedge and is safe to use on bermudagrass. Kerb is good for ridding Poa annua but it is very important to get a good control rate. Kerb's residual action is desirable in that there is a margin for error in when to apply it as a preemergent. As a postemergent Kerb does well but it also can stunt the bermudagrass to some degree. As a preemergent Balan has also shown control of Poa annua. For nonselective herbicides Paraquat, Dowpon C and Round-up seem to be the chemicals most used. Paraquat and Dowpon C give excellent quick kills. Round-up takes up to two weeks to kill but it gives a complete kill of the weed.

The following algicides are in general use for our area: Aquazine, Copper Sulphate, (Lake Dye).

Aquazine is excellent for algae control in lakes that are not used for irrigation. Copper sulphate works well on floating

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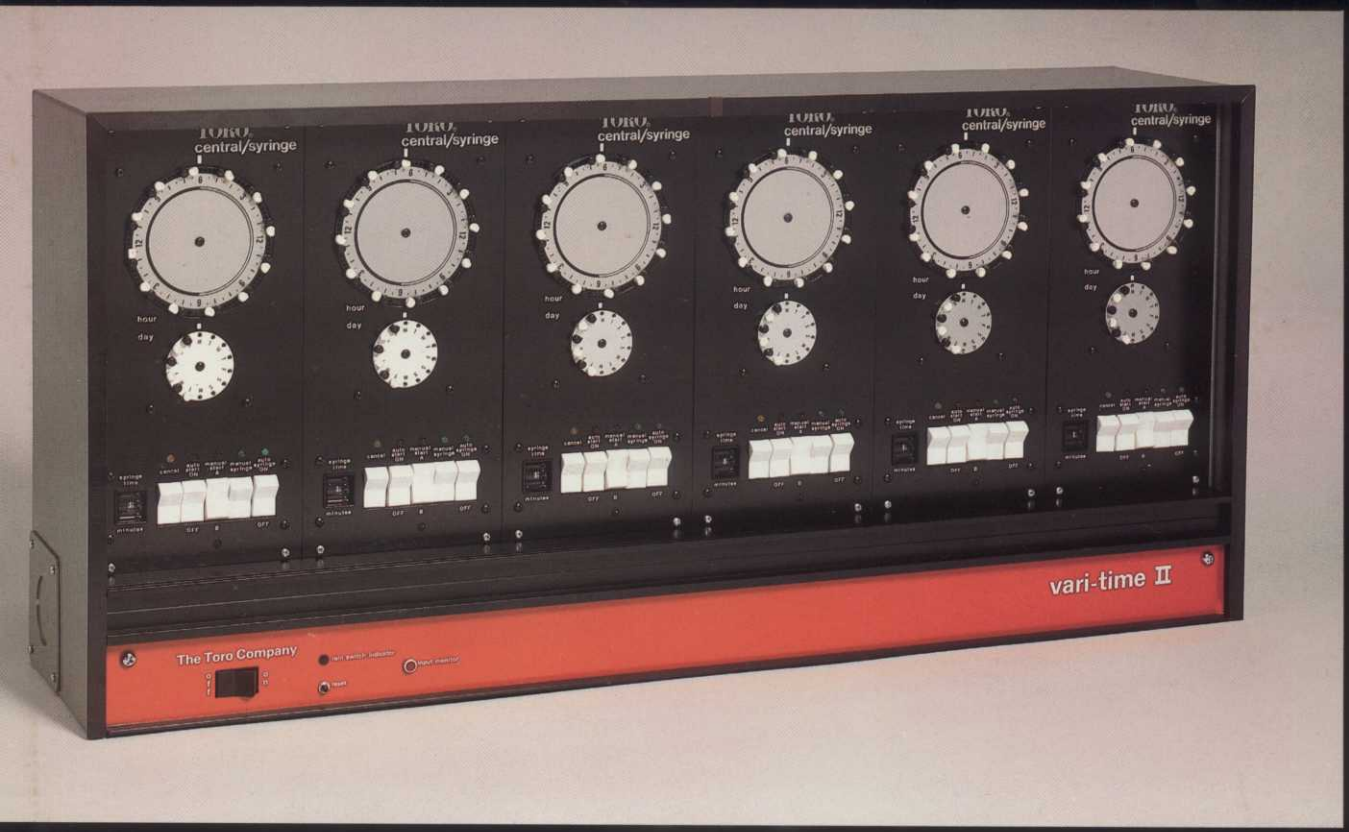

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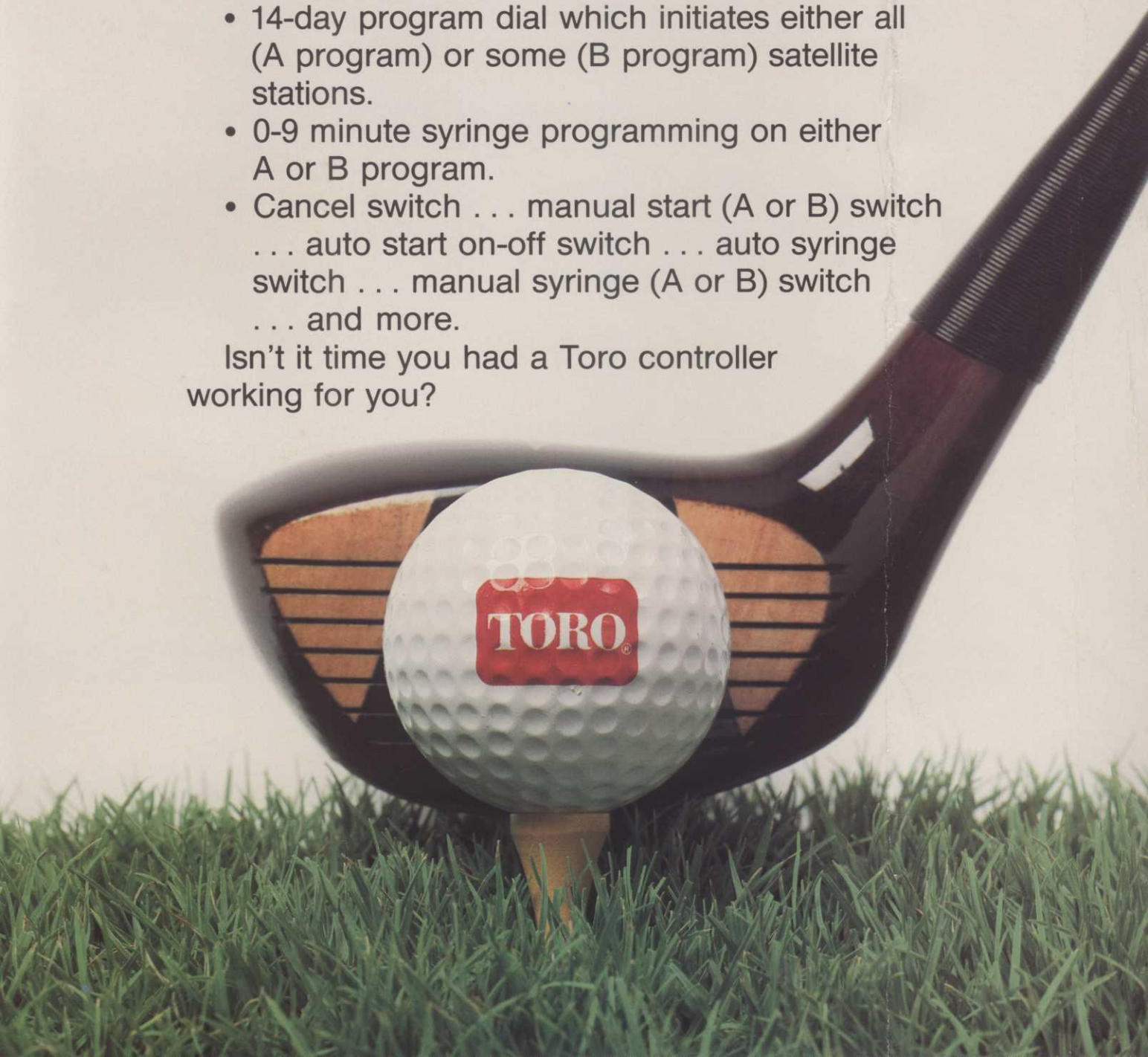

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algae. Lake dye is not an algicide but it works well to mask out sunlight in the lakes and prevent algae blooms.

A limitation as to which pesticides we can use and for what purpose has been legislated on us, the pesticide users, especially insecticides and nematicides. Many effective materials that were used in the past are no longer on the market and others will probably be gone in the near future. Probably the biggest limitation in the use of pesticides is economics. The price of material is making the choice for us as to what to use and when it is necessary to use pesticides.

FTGA Tournament Results

Randy Robbins scored a three-stroke victory in the FTGA golf tournament. Superintendent of the Gainesville Golf and Country Club, Robbins used his accuracy on the greens for only 27 putts in his pacesetting score of 70. Ron Hill, CGCS, Amelia Island, also a member of the North Florida Chapter, was runnerup. There were three tied at 75: Dennis Packer, Cape Orlando Golf Club; J. W. Stamps, and Dave Fry.

The tournament site was Turkey Creek Golf and Racquet Club, Alachua. Golfers had high praise for the condition of the course and the smooth, fast putting Tifgreen 328 bermuda greens. The host superintendent was Jeff Hayden and the host professional Roger Krueter.

Selection of the state team ended with the FTGA tournament. The winners of the three statewide golf tournaments and the best overall finisher will make the trip to Anaheim, California. The team will be Roy Hill, CGCS, North Florida Chapter; Fred Klauk, Palm Beach Chapter; Robby Robbins, North Florida Chapter, and Dan Myers, CGCS, West Coast.

The team event will be scored with the three best scores of the four-man teams. The tournament is a 36-hole event prior to the 52nd International Turfgrass Conference and Show. Our next issue will PROBABLY have full details of our CHAMPIONSHIP TEAM victory.

Turfgrass Field Day

A turfgrass research field day will be held on April 1, 1981 at the Agricultural Research Center in Fort Lauderdale. Current research projects on turf management, pest control, and cultivar evaluations will be presented.

All persons interested in turf are invited to attend. Activities will start promptly at 1:00 p.m. Come dressed for the weather.

For further information contact Dr. Bruce J. Augustin, Agricultural Research Center, 3205 S.W. 70th Ave., Ft. Lauderdale, FL 33314. Telephone (305) 475-8990.

Treasure Coast Chapter Formed

As most Florida Golf Course superintendents were busy getting their courses ready for the upcoming season, superintendents from Martin, St. Lucie and Indian River Counties took time from their already overloaded schedules to form the Treasure Coast Chapter of the Florida Golf Course Superintendents Association this past summer.

After two organizational meetings at the Sandpiper Bay Resort in July, 15 area superintendents had laid the strong foundation required to get the ball rolling. As of November 1, the Treasure Coast Chapter had 40 paid members on its roster.

Serving as association president is Adam Yurigan, Jr., superintendent of the John's Island Club in Vero Beach. Other officers include: Lonnie Stubbs, V. P. for internal affairs (Sandpiper Bay Resort); Tom Burrows, V.P. for external affairs (Turtle Creek Club); James Callaghan, secretary (Riomar Country Club; Joe Snook, treasurer (Riverbend Country Club); Craig Baker, director (Indian River Plantation); Leo Cushing, Jr., director (Crane Creek Golf and Racquet Club).

According to President Yurigan, "We may be a small organization but we have a strong nucleus and expect continued growth. Attendance at our monthly meetings has been over 75%. I think that shows a very keen and sincere interest in our association."

The Treasure Coast Chapter meets the first Wednesday of each month and meetings are open to all Florida golf course superintendents.

Officers of the recently formed Treasure Coast Chapter of the Florida Golf Course Superintendents Association are from left to right, Lonnie Stubbs, Bill Mangold, Craig Baker, Adam Yurigan Jr., Joe Snook, James Callaghan and Tim Burrows.

South Florida Pesticide Report

By BRAD KOCHER

As members of the turfgrass industry, specifically golf course superintendents, each of us has a responsibility to our employers, and our members to present the best possible playing conditions on our golf courses. Due to the vast wariety of pests which attempt to inhibit our efforts, we find it necessary to use pesticides to control these undesirables.

Through the use of these different pesticides we are put in the midst of a multitude of additional responsibilities. First and foremost is the responsibility to our environment. None of us wish to use a pesticide that will have a long lasting detrimental effect on our surroundings. We must use the correct target pesticide, at the proper time, at the proper rate, under suitable weather conditions, with the proper equipment, and using adequate safety measures.

In respect to the environment and proper timing, a pesticide management practice begun in the early 1970's is termed Integrated Pest Management (I.P.M.) The concept, in part, is concerned with attempting to get away from "time treatments" of pesticides. For example, treating golf course greens every three weeks for armyworm or sodwebworm control on a preventative basis would be considered "time treatment". I.P.M. dictates constant monitoring of turf activity, followed by evaluation and treatment if necessary with as narrow a target pest control as possible.

I.P.M. also looks to natural predators for control. The citrus blackfly has been controlled in South Florida largely with the introduction of the Ametis hesperidum wasp. Certain virus are instrumental in the control of some pests, and in the Northeast nematodes have controlled the overpopulation of crop damaging grasshoppers. Another variety of wasp has proven somewhat effective in controlling mole crickets. I.P.M. has a great future both from an ecological and financial aspect and should be a valuable tool to us as turf managers.

Certain other responsibilities require us to be as knowledgeable as possible in areas of pesticides. We should know what pesticides are targeted for certain pests and at what rates they should be applied. The most valuable text each superintendent should have is the *Florida Insect Control Guide*. There are sections on insecticides and miticides; ornamental and turf (of particular interest); livestock; forest and shade trees; field crops and pastures; fruits and nuts; household insects; poultry insect control; stored products; vegetables; and miscellaneous. "The *Insect Control Guide* is a compilation of the official insect control recommendations of the Institute of Food and Agricultural Services (I.F.A.S.), University of Florida," and is updated periodically.

Another important publication is the *Farm Chemical Handbook*. It contains sections on the plant food dictionary; applicators guide; pesticide dictionary; buyers guide, and addresses of chemical manufacturers. I have found this publication extremely valuable, and use it quite frequently. The Golf Course Superintendent's Association of America publishes a *Pesticide Usage Reference Manual*. Its text discusses safety, equipment and its uses, and application. All of these publications and others are invaluable in assisting us become more educated pesticide applicators. A list of these publications and how to obtain them will be found at the end of this article.

Having talked with numerous superintendents in the South Florida area I have found a great variety of pesticides used, differing rates, and opinions on the effect of certain pesticides. Most notable are comments from a few superintendents concerning Sencor. We have had a season or two to judge this product and comments range from "excellent" to "I won't use it again". Most everyone is using recommended rates; however, there is a certain degree of unpredictability that has some individuals reverting back to strictly MSMA. I believe, however, that Sencor has found a place in many herbicide programs and with proper

(Continued on Page 23)

precautions and application methods it will become a valuable herbicide.

Most broadleaf control in fairway and rough areas is done with 2-4-D or Trimec. Reduced rates of 2-4-D are used on greens for broadleaf weed control.

Approximately half of the superintendents surveyed have used Basagran. The ones who have, have found it to be excellent for controlling yellow nutsedge at the recommended (sp) rates. We have used Basagran to eradiacte sedge on 328 greens, and on greens overseeded with rye or bentgrass at 1 oz. to 1 gallon of water in a pump-up hand sprayer with no discoloration of turf grass.

Control of sodwebworms and armyworms has been accomplished primarily with alternate applications of several insecticides. The most popular pesticides are Diazinon, Toxaphene, Sevin, Proxol, Dursban and a newer pesticide Primicid. All work well for control of armyworms and sodwebworms.

Although fungicides do not play a major role in Florida turfgrass, they are used more extensively during winter months, particularly on overseeded greens. Manzate 200 or fore in combination with Tersan 1991 is a widely used treatment as is Daconil 2787. Each product provides excellent control for dollar spot or brown patch. Manzate 200 or fore is also effective for algae control on greens.

Mole crickets have become an ever increasing problem in Florida and are being controlled with Mocap 5G or 10G, Diazinon or Baygon 70 W.P. There are also numerous baits with either Dursban, Toxaphen, Baygon or Malathion as the active ingrediant. The effected areas should be watered prior to and after application when using the liquid or wettable powder applications. Granular baits should have no water after application. Late afternoon is an excellent time to apply baits and preferably on a night when there is no chance of rain. The treated areas should not be irrigated the evening following application. Any rain or irrigation on baits washes out the active ingredient making them ineffective. Excellent success is also evident with high pressure injections of insecticides for mole crickets. The injection units are sizable initial investment; however, the extra penetration of insecticides into areas where mole cricket activity occurs makes the insecticides much more effective.

Nemacur is the most widely used nematicide with most superintendents treating greens at least once a year just following aerification. Nemacur granules are applied at 3 lbs/1000 sq. ft. with excellent results.

Safety of our applicators is another prime consideration. Applicators should be highly educated in areas of pesticides and know the proper storage, handling and methods of application. They should be familiar with such terms as toxicity, LD 50, caution, warning, danger, oral and dermal dosages, signs of overdoses, danger to environment. They should be given physical exams at least twice a year and should be kept abreast of new and better safety procedures. They should be provided with the proper safety equipment and sprayers that are in excellent working condition. They should be made to feel a sense of pride and accomplishment as well as a strong sense of responsibility. Our spraymen will only be as responsible and knowledgeable as we help to make them and as we are ourselves.

Knowledge and communication are two of the most valuable tools we possess and through effective use of these we will become more proficient in the use of pesticides. Through research, proper labeling of chemicals, and periodic checks on environmental reactions, we will become more effective. We should all be kept abreast of new regulations, new products and application methods and rates. There are state sponsored educational sessions, classes offered at local and state universities, the Florida Turfgrass Association, local, state and national superintendents' associations and vast amounts of literature available to help us to increase our overall knowledge.

Insect Control Guide ($10.00); *Nematode Control Guide* ($10); *Plant Disease Guide* ($15); and *Weed Control Guide* ($15) can be obtained from Mr. Chick Hinton, Bldg. 664, University of Florida, Gainesville, FL 32611

Farm Chemical Handbook ($29 + $2 shipping before January 31; $35 + $2.00 shipping after January 31). Meister Publishing, 37841 Euclid Avenue, Willoughby, OH 44094, ATT: Circulation Dept.

Pesticide Usage Reference Manual ($6.50 to GCSAA members, non-members $9.75) GCSAA Information Central, 1617 St. Andrews Drive, Lawrence, Kansas 66044

Long Term Pesticide Effects Under Study

Reprinted from March 1980 Issue of Nursery Business

Increased demand for more production on less land has pushed farmers into a sophisticated agriculture which relies heavily on the use of chemicals to control pests.

Some of the chemicals, or pesticides break down rapidly after use and are considered harmless. Others leave residues for years and could be considered dangerous. They all behave differently.

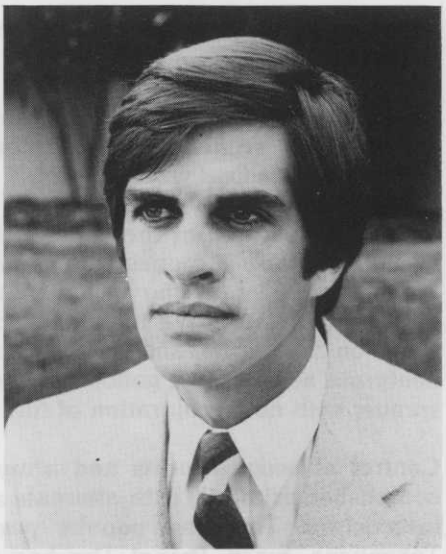
At Clemson University, SC Experiment Station soil chemist K. S. LaFleur is taking a close look at the behavior of pesticides applied to the soil in an effort to determine their long-term effects on crops and consumers.

About 1,200 pesticides, in some 35,000 formulations are registered with the U.S. Environmental Protection Agency. How safe are they?

Before soils can be considered maringally safe, LaFleur says, "they must lose at least 90 percent of applied pesticides."

Because testing a single material for its residual effects is a long, tedious process, LaFleur is constructing a mathematical 'prediction model' designed to evaluate long-term effects of pesticides. The model is based on intense study of 12 of the most representative presticides, chosen for their diverse chemistry and usefulness in South Carolina.

(Continued on Page 25)



Dr. Batterson Named To Research Center Faculty

Dr. Ted R. Batterson has recently joined the faculty as an assistant professor at the University of Florida Agricultural Research Center in Fort Lauderdale. The position he fills was created with the establishment of the Aquatic Weed Research Center, a functional element of the Institute of Food and Agricultural Sciences (FAS) of the University of Florida, located at Gainesville. He joins an interdisciplinary group of both university and USDA personnel who are jointly cooperating in research concerned with controlling aquatic weeds. His research will in the development and implementation of an integrated approach to noxious aquatic weed control incorporating biological, chemical, and mechanical means.

Dr. Batterson received his B.A. in Biology from Western Michigan University and his M.S. and Ph.D. degrees in Aquatic Ecology from Michigan State University. During his graduate program he served as both a teaching and research assistant. Teaching responsibilities included involvement with courses taught on campus as well as at the Kellogg Biological Field Station. As a research assistant he was actively involved in a variety of projects concerned with the aquatic environment.

West Coast Pesticide Report

By DAN MEYERS

It seems that other than the pesky mole cricket, this summer was very productive for our area. Weed control programs were good as mother nature did not interrupt as it did last year; June through September we had a little over 20 inches, but we had that much in September last year. There was not much fungus reported. Curvularia was the only major problem and Daconil on the second and third application controlled it.

NEMATODES

Of the 10 superintendents surveyed, nine treated their greens twice/year with Nemacur for nematodes. The other individual treated three times and also used Dasanit. Bill Hall of Buckhorn Springs and Dick Grill of Lakewood were the only two who had contract injection with DD & EDB. Both are happy with the results.

MOLE CRICKETS

Dick Grill and Bill Hall insected with DD & EDB for nematodes and as a direct result have very little mole crickets. Dick is using the Dursban Bait and Dasanit for any spot problems. Fred Tucker of Timber Oaks and Gary MacDougall of Airco used Baygon in their Hydra-Ject for good control. Fred is considering using Mocap Liquid next year. Dan Morgan of Sun City has just purchased a Hydra-Ject. Reed Lefebvre of Plant City and Marshall Edgren of Carrollwood Village are planning to purchase a Hydra-Ject next year. But this year Reed, Marshall, Frank Deliello of Indian Rocks and Dan Meyers of Temple Terrace used more nematicides for spot treatment than the Baits and Baygon.

In summary it seems there is a growing trend to purchase a Hydra-Ject for the control of nematodes and mole crickets. For those who are unable to do so, spot treating with the three nematicides — Nemacur, Dasanit and Mocap — is occuring.

One question which has arisen and is being looked into is: what are the possibilities of spraying Mocap Liquid for nematodes and mole cricket control?

Presently LaFleur can closely predict the degree a pesticide will be absorbed by soil and how it will move in the soil during and after rainfall. He'll next characterize the rates of chemical breakdown by soil organisms and by weathering and then integrate all steps into a model that will reveal individual traits of 'new' pesticides.

The model will help separate the chemicals which pose little or no threat from those which are definitely dangerous.

"Greater sensitivity to danger may add to bias against useful, relatively harmless pesticides," says LaFleur. "Short-lived, low toxicity types should not share the guilt of persistent, toxic or carcinogenic types. The prediction model will help expose the difference."

The 12 pesticides being examined were produced and used "before anyone really knew their long-term effects on us and the rest of the ecosystem. And this is risky."

LaFleur says more sophisticated detection and testing methods have given rise to new awareness of long-term dangers of pesticides previously though relatively harmless.

"People weren't actively looking for hidden dangers, and earlier chemists didn't realize some chemicals are so dangerous. The problem is we just can't keep pace with our own discoveries."

Central Florida Journal

By GARY MORGAN & SUSAN MORGAN

This is our first article in *The Florida Green*, and we are looking forward to every issue and to everyone's participation. We would like to say it is great to be a part of the Florida Golf Course Superintendents Association. We are proud of this association and will strive for continuity throughout the state.

We would like to welcome our new president, Bill Wagner. We know the upcoming year will be very rewarding and prosperous for the State of Florida.

The Central Florida Chapter has made major changes in our by-laws during the past year to come in line with the state association. They are working out well.

As host chapter of the "Fourth Annual Crowfoot Open" we would like to thank all who participated and all our sponsors. Without our sponsors this tournament would not happen. Please support these people as much as possible.

We would like to congratulate The West Coast Golf Course Superintendents Chapter for the fine distinction of being the "Fourth Annual Crowfoot Open" Team champions and the North Florida Golf Course Superintendents Chapter for being the Team Low Gross champions. Fred Klauk is to be congratulated for being the Individual Low Gross champion with a fine 71 on Suntree Country Club's championship golf course. Our Crowfoot committee chairmen, Jim Ellison (The Bayhill Club) and David Miller (Estech Corp.), did a fine job in running the tournament. Tim Hiers, superintendent at Suntree C.C., is to be congratulated on a golf course in excellent shape for the tournament.

Tim recently had the second stop of the PGA Seniors Tour, a new tournament, and again the course was in fine shape.

(Continued on Page 28)

Tips on Tank-Mixing Pesticides

Tank mixing of pesticides is being done more and more by lawn care people and golf course superintendents to control weeds, insects and diseases. And they save labor in many uses by adding pesticides to fluid fertilizer instead of water as a carrier. Careful tank mixing is important to avoid problems. It works well as many farmers and fruit and vegetable growers have expererienced for years.

1. Read the labels carefully for all products you will mix. Follow directions.

2. Do a small scale "jar" test for compatibility as follows.

   Place one pint of carrier-water or fluid fertilizer in a quart jar. Add each pesticide or a pre-mix of pesticide in water, one at a time, and shake well with each addition. Use each product in the same proportion to carrier as it will be in the actual tank mix.

   Unless labels indicate otherwise, add pesticides in this order: wettable powders first, followed by flowables, water solubles, surfactants and emulsifiable concentrates.

   Invert the jar 10 times, then inspect the mixture immediately and after standing quietly for 30 minutes. If a uniform mix cannot be made or if nondispersible oil, sludge or clumps of solids form, the mixture is incompatible and should not be used. Minor separation after 30 minutes, without sludge or clumps and which remixes readily with 10 jar inversions, is tolerable if field spray tank agitation is good and keeps the combination mixed.

3. When you tank-mix in volume, put 2/3 of the carrier in the tank first. Then add pesticides one by one, with wettable powders first. Agitate for thorough mixing after each addition, before pouring in the next. Finish filling the tank with carrier.

4. Keep agitation going at all times on the way to the field, during application and during stops for any reason. Empty the tank preferably on the day of mixing. Do not allow mixture to stand overnight without agitation. Check labels for temperature and humidity data as they affect mixing or delay in use.

5. With any new combination, test your tank mixture on small areas, at varying rates and conditions of use before large scale use. Check you State College or extension agent for test data and on variations in local water supply that may affect performance.

6. Use exact dosage rates for registered tank mixes. Changes may cause crop injury or poor performance on weeds or pests.

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DR. TIM BOWYER, Vice President. 11 years in the turf industry. Agronomist specializing in plant pathology. With several years at University of Georgia Cooperative Extension Service, dealing with golf course superintendents and their unique problems. Author of several turf-related publications.

RICHARD HURLEY, Vice President, 18 years in the business, including 5 years as superintendent. Several years as Director of Research for Lofts Pedigreed Seed. Consultant for turf specialists throughout the country.

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The National Team Championship, a recent PGA tournament, was held in our area at Walt Disney World Course with John McKenzie, C.G.C.S., as host superintendent. The golf course was in great shape and John should be congratulated.

For those of your who don't know, the officers in the Central Florida Chapter are:

Gary Morgan — President — Sherwood C.C.
John McKenzie — Vice President — Walt Disney World
Dwight Singo — Sectary-Treasurer — Big Cypress C.C.
Aris Catsam — Past President — Rolling Hills G.C.
Danny Aylwin — Director — New Smyrna Beach G.C.
Louis Edwards — Director — Fairgreen Golf Club
Bill Galliart — Director — Winter Park G.C.
Edward Harvey — Director — Deer Run G.C.
Wayne Renner — Director — Winter Greens G.C.

Please feel free to call any one of us at any time. We are here to help you — the superintendents — our chapter and the Florida Golf Course Superintendents Association.

Central Florida Pesticide Report

By GARY MORGAN & SUSAN MORGAN

The Central Florida region is a very broad area and probably has all the insect problems and weed problems that everyone has throughout the state, since the area is in the middle of the state and covers deep inland areas to coastal regions. We also experiment with many different chemicals in hope of finding that one chemical that will control the insect or weed that is giving us a particular problem. Since the E.P.A. regulates the distribution and use of our most widely used chemicals, we are forced to find other and newer means of control whether preventative or curative.

Here are some of the methods used by our superintendents and their reasons why. We hope you can use this information in your operation. Please feel free to call any one of us if you have any questions about one of our practices.

Tim Hiers — Golf Course Superintendent
Suntree C.C. Melbourne

Nematodes:
EDB was used on fairways with good results. Also received good residual on Mole Crickets. Treatment was done in early June.

Mole Crickets:
Dursban Bait .5% @ 120 lb/A
Mocap at label rate.

Goosegrass:
Greens — no control needed.
Fairways — MSMA + 2,4-D (3 treatments)
(1) 2qts MSMA/A + 1 pt/A 2,4-D
(2) 2qts MSMA/A + 12 oz/A 2,4-D
(3) 2qts MSMA/A + 8 oz/A 2,4-D
Also used was Sencor + MSMA
1/8 lb Sencor/A + 2 lb/A MSMA

Worms:
Primicid at 1½ qts/A — best results
Diazanon AG 500 at 2 qts/A (Green Banks)
Sevin at 10 lbs/A — fair results
Lannate at 2/5 oz/1000 sq ft — fair results

Dwight Singo — Golf Course Superintendent
Big Cypress Golf Club, Winter Springs

Nematodes:
No control this year. Will probably use EDB next year.

Mole Crickets:
Mocap was used at 100 lbs/A. Excellent results with proper water and soil moisture.

Goosegrass:
Fairways — used Sencor and MSMA
3 oz/A Sencor + 2 lb/A MSMA (2 applications)
Greens — 8 lb formulation MSMA + 2,4-D
(1) 24 oz MSMA/A + 8 oz 2,4-D + 2 pt sticker
(2) 24 oz MSMA/A + 2 pt sticker
(3) 24 oz MSMA/A + 8 oz 2,4-D/A + 2 pt sticker

Worms:
Primicid at 1 qt/A with 3 weeks residual
Toxaphene at 1 pt/A
Diazanon AG 500 at 1 qt/A

Bob Williams — Golf Course Superintendent
Indigo Golf Club, Daytona Beach

Nematodes:
No control used in fairways.
Scotts Mocap was applied to trap edges at 5 lbs/1000 sq ft. Also good results for Mole Crickets.

Mole Crickets:
Diazanon and Sevin was used with real good control. Soil moisture was real good when chemicals were applied. Diazanon at 1½ gal/A and Sevin at 5 lbs/A with 10 oz/A of Wet in.

Goosegrass:
Only early Spring applications were used.
MSMA + 2,4-D (3 applications)
(1) 2 qt/A MSMA + 1½ pt/A 2,4-D + 1 qt/A Wet in
(2) 2 qt/A MSMA only
(3) 2 qt/A MSMA + 1 pt/A 2,4-D + 1 qt/A Wet in

Worms:
Sevin is used at 4 lb/A. It does a real good job and is also used on St. Augustine lawns.

Louis Edwards — Golf Course Superintendent
Fairgreen Golf Club, New Smyrna Beach

Nematodes:
EDB was used in May with good results. Not much residual was seen for Mole Crickets. Nemacur was also used on greens at 3 lbs/1000 sq ft with good results.

Mole Crickets:
Mocap at label rates with very good results. Have tried irritants with not much luck.

Goosegrass:
Very little on course. What there is, is hand picked.

Worms:
Sevin is used at 6 lbs/A with excellent results. Finds good residual with Sevin.

Gary Morgan — Golf Course Superintendent
Sherwood C.C., Titusville

Nematodes:
EDB was used on fairways and tees with excellent results at 4 gal/A in April. Nematodes were controlled and excellent residual was found on Mole Crickets.

Mole Crickets:
Dursban .5% Bait is used where needed at 100 lbs/A.

Goosegrass:
6.6 lb formulation MSMA was used on greens and tees at 1 oz/1000 sq ft at 5 day intervals. Good results.
Sencor and MSMA was used on Fairways with poor results at 1/4 lb Sencor and 1½ qt/A MSMA.
Asulox was used at 5 pts/A with excellent results. Bad burn on Bermuda but it recovered successfully.

Worms:
Primicid at 1½ oz/1000 sq ft. Good results and finding a 4 week residual.
Diazanon AG 500 at 2 oz/1000 sq ft with good results and 2 week residual.

Jim Ellison — Golf Course Superintendent
The Bayhill Club, Orlando

Nematodes:
EDB was used. Excellent control of nematodes and residual on Mole Crickets. Will use same next year.

Mole Crickets:
EDB has such good results that not too much more mole cricket activity was noticed. Any mole crickets found were treated with Dursban .5% Bait.

Goosegrass:
(1) Greens: MSMA 1oz/1000 at 5 day intervals. Hand picking is also done.
(2) Fairways: Sencor + MSMA used. These applications at 1/4 lb/A Sencor + 2 qts/A MSMA each. Each application spaced at 14 to 17 day intervals.

Worms:
(Preventative Program)
Diazanon AG 500 — 2 qts/A
Primicid — 1 qt/A with 2 week residual

Lloyd Clifton — Golf Course Architect and Consultant
Deland

Nematodes:
EDB is liked very much but thinks the phytotoxicity should be strongly looked at. Nemacur on greens at 3 lbs/1000 sq ft.

Mole Crickets:
Use Dursban .5% Bait and other available chemical controls.

Goosegrass:
Greens — MSMA at 1 oz/1000 sq ft at 5 day intervals.
Fairways — MSMA + 2,4-D at 5 day applications (3 applications)
(1) MSMA 2 qts/A, 1 pt/A 2,4-D
(2) MSMA 2 qts/A, 8 oz/A 2,4-D
(3) MSMA 2 qts/A, 8 oz/A 2,4-D

All About Sprayers

By O.W. "RED" KROMER

A sprayer for application of chemicals is one of the most essential machines for golf course maintenance. Many courses have two or three sprayers, using one exclusively for herbicides and another for fungicides. This means each sprayer is supplied with the proper nozzles and calibrated to apply the correct amounts of spray mixtures. If it is not economically feasible to own two or three machines, then one good commercial type sprayer should be obtained and be adaptable for both hi and low pressures.

Chemical weed control requires the exact amounts of chemical, uniformly applied. At first it may seem complicated to apply a specific amount of chemical per 1000 sq. ft. However, it is quite simple if taken a step at a time. The components of a sprayer and their functions should be thoroughly understood, as well as the variables, which must be controlled to give an accurate spray application.

First, the sprayer. The tanks should be corrosion resistant, have a large filler opening for cleaning and have jet or mechanical agitator. The pump can be low pressure — roller, gear, rubber impeller centrifugal or turbine — with a capacity in gallons per minute at least 50 percent greater than the nozzle and jet agitator requirement (if a jet agitator is used). This allows for pump and nozzle wear. The ideal machine would have a multiple piston pump with a mechanical agitator. A piston pump machine can be used for hi-pressure machinery cleaning, tall tree spraying or fire fighting and is easily repaired when worn. A sprayer should have an accurate gauge, preferably brass, glycerin filled with not over 100 p.s.i. calibration for accuracy around 30 to 60 lbs. — the low pressure spraying range. If the machine is also a hi-pressure unit, the low pressure gauge can be replaced with a hi-pressure gauge or a valve installed below the gauge to shut it off for hi-pressure spraying.

The pressure regulator should have sufficient capacity so that low pressure can be obtained and be sensitive so it controls the pressure accurately. A dual low and hi-pressure system can be installed on a hi-pressure sprayer, allowing the low pressure regulator and gauge to be used for boom spraying. When the boom is shut off, the hi-pressure system with its regulator and gauge can be used for hand spray gun work. With a dual system, the hi-pressure regulator should be made so it can be triggered to relieve the hi-pressure for low pressure work.

Nozzles must be chosen for size, from the nozzle chart, to give the gallonage rate desired at the recommended pressure and travel speed. Most nozzles are rated at 30 p.s.i. and 4 m.p.h. and 20″ spacing. A 20″ nozzle spacing is preferred over 10″ spacing because it has a larger orifice, therefore it is more difficult to clog. Also it is more accurate and produces larger droplets for herbicide work — larger droplets give better weed kill and are less affected by wind. The matching screen can have coarser mesh allowing the fine particles to pass through the screen and nozzle. The deflector or flooding type nozzle, as it is called (a misnomer), is preferred because it has a cylindrical orifice, which retains its accuracy at least 10 times the life of the original fan type nozzle. In addition to this, it continues to spray a broad fan throughout its useful life, where with the conventional fan nozzle, the spray pattern gets narrower and narrower as the discharge orifice wears, finally shooting a solid stream of much greater volume.

The deflector type has the added advantage of producing larger droplets, which produce better weed kill (by University test) and are less affected by wind.

The boom we prefer is a smooth, stainless tube of sufficient size — 3/4″ I.D. or larger so the end nozzles receive the same pressure as the one near the feed hose. It is also preferable if the nozzles come out of the side of the boom instead of the bottom, as this allows dirt particles and precipitated chemical, bypassed by the main screen, to settle to the bottom of the boom rather than going right into the nozzle screen.

Factors Affecting A Spray Application

By O.W. (RED) KROMER

To have a successful spray application, a number of factors must be considered. Controlling these factors is more important for a herbicide application than for applying insecticides or fungicides. These factors are:

1. Nozzle spray pattern and discharge rate.
2. Boom and hose capacity.
3. Accurate pressure control.
4. Speed of travel.
5. Chemical and water mixtures.
6. Spray swath overlap or skip.
7. Boom stability and boom height above the target area.
8. Wind and climatic conditions.
9. Timing.

Nozzles wear with use which increases their discharge rate and narrows their spray fan. This can happen quite quickly with the old style fan nozzle with a sharp oval shaped orifice. The flooding type fan nozzle will retain its accuracy and fan width much longer. It also produces larger droplets which are less affected by wind. The larger droplets also give better control of broad leafed weeds by actual University tests.

The boom and hoses should be of sufficient size and smoothness so that all nozzles will discharge the same quantity of fluid. This becomes increasingly critical for higher gallonage applications. For low pressure spraying, 30 to 60 lbs., a low pressure regulator must be used. A high pressure regulator is not sensitive enough for low pressure work. If the sprayer has the pump and hose capacity for high pressure use (500 to 600 lbs.) then both high and low pressure regulators should be used in the system with valving, so either system can be used. A sprayer of this type with a piston pump is useful for cleaning machinery, tree spraying, fire fighting, etc.

Accurate travel speed is essential for a herbicide application. A good slow speed speedometer (0-10 m.p.h.) would be very helpful. This speedometer can be obtained as a sprayer accessory and is equipped with a small rubber tired wheel which can be mounted against any wheel that rolls on the ground — even cleated tractor tires — and will register accurate ground travel speeds.

Chemical and water mixing must be done accurately especially when topping off a partially filled tank. Spray swath skip or overlap is especially difficult to control. For accurate application, the outer nozzle on the boom on the return trip would have be held 20 inches over from its previous position — for a boom with 20 inch nozzle spacing, this is impractical under field conditions. For agricultural spraying, with sensitive grain crops, a die marker is used. However, for golf course use this would be objectionable. Therefore, as grass is not as sensitive to the spray chemical as grains it is better to overlap the spray swath.

The boom should be held rigid when spraying. It should not be free to swing. Also it should be held above the spray target at least 20 inches so the nozzle pattern can spread to give a uniform coverage.

Wind and climatic conditions can have a detrimental effect on spray application. For weed control, a clear, warm, sunshine day with no prospect of an immediate shower are ideal conditions. Timing refers to the growth stage of the weed when the spray application will be most effective.

A word on the use of a hand gun for spraying greens or other broadcast applications. For an accurate application, a hand spray boom should be used and be at least 20 inches above the spray target unless 10 inch nozzle spacing is used. Then the boom could be 12 inches above the target. The support wheels for the spray boom should be one-half the spray nozzle spacing beyond each end nozzle. Then you can use the wheel tracks as a guide on the return trip. A pressure gauge should be on the hand spray boom to indicate the pressure there.

Alarmed About Armadillos?

By WAYNE R. MARION
Extension Wildlife Specialist

Armadillos are rather unusual looking animals that belong to a family of mammals found primarily in Central and South America. The earliest fossil ancestor of our North American armadillo is from the Paleocene; it was as large as a rhinoceros. Our present-day armadillo, *Dasypus novemcinctus*, is much smaller; adults normally weigh from eight to 17 pounds. The species ranges from Texas eastward throughout the South; its range is expanding rapidly northward into Missouri and eastward into South Carolina . However, cold weather will limit the further expansion of the northern boundary of the armadillo's range.

Description

Armadillos have a shield-like shell that is covered with horny scales. Joints in the shell are flexible, which enables the animal to bend and twist. Only the ears and belly of the armadillo are without bony armor. These peculiar animals have 28 to 32 peg-like teeth in simple rows well back in the mouth. There are no front teeth. Armadillos have poor eyesight and hearing, but a keen sense of smell. Both male and female are about the same size, look alike, and have similar habits.

Reproduction

Although armadillos may breed in late July, the five-month gestation period is somewhat delayed which results in the young being born in February or March. Only one litter is produced each year, and it always includes four identical young of the same sex. The young look like the adults except that they are smaller and their armor coat remains soft and leathery for some time, becoming harder with age.

Typical Habitat

Armadillos inhabit dense shady cover, such as brush, woodland or pine forests. They frequently rest in a deep burrow during the day and become much more active during the night, early morning, or late evening. Burrows which are located under brushpiles, stumps, rockpiles, or dense brush, are usually seven to eight inches in diameter and up to 15 feet long. Armadillos usually have several burrows and depend upon their ability to escape danger by running to the nearest burrow. Despite their awkward appearance, armadillos are agile runners and good swimmers — and even have the ability to walk underwater across small streams.

Feeding Habits

These animals feed primarily on insects and invertebrates, including ants, grubs, and earthworms. Armadillos usually root or dig in ground litter in search of food, but will occasionally eat berries and mushrooms. Reports of armadillo damage to birds' nests on the ground are rare.

Damage Caused

As a result of foraging activities, armadillos dig numerous burrows and holes in lawns, flowerbeds, gardens and pastures. The burrowing in pastures poses a potential hazard to cattle. Armadillo damage, which is both costly and unsightly, has caused increasing concern for homeowners, farmers, and ranchers. Armadillos are, to some degree, beneficial because they eat insects and larvae. But to most people, these animals are a nuisance to private properties. There are a number of ways of controlling damage by armadillos.

Methods of Control

If armadillos are causing damage to yards, flowerbeds, or shrubbery, it may be necessary to initiate preventive measures or to control local individuals or populations to reduce the damage. Preventive and control methods suggested include:

1. chemical treatment of soils to reduce the local food supply,
2. use of repellents,
3. erection of barriers (e.g. fences),
4. use of live traps for capture and relocation
5. fumigation of burrows, and
6. shooting of offending individuals.

Since the use of chemicals such as chlordane and heptachlor, and the use of steel traps has been legally restricted, control measures must be modified accordingly. A chemical which discourages armadillos from digging in lawns and gardens by killing insects is diazinon (available in granular form with either 5% or 10% active ingredient). Diazinon, used at a rate of 40 pounds of 10% granules or 80 pounds of 5% granules per acre on lawns and around gardens, usually provides considerable relief from the digging activity of armadillos. For best results, these granules should be applied just prior to a rain, or the treated area should be thoroughly watered soon after treatment. All children and pets should be kept off the treated area until it has completely dried. It takes about two weeks following treatment for granular diazinon to become effective. In using this chemical, be sure to follow all precautions and restrictions on the label.

It has been suggested, but not thoroughly tested, that moth

(Continued on Page 33)

balls sprinkled in the yard or garden are effective as a repellent for armadillos. Also, where the damage is localized, small fences (10-12 inches high) may be used to keep the animals out.

Armadillos can be trapped in live traps (such as available from Havahart, P. O. Box 551, Ossining, NY 10502) or in homemade box type traps. Animals caught in these traps can be released unharmed into another area several miles away. Traps should be located near the entrance of armadillo dens or burrows and baited with spoiled or overripe fruit (e.g., apples, pears, etc.). If other species of animals get into these live traps, they can be released unharmed.

Fumigating burrows with toxic gases is another technique to reduce armadillo damage. This technique, however, is suggested only as a last resort due to the secondary poisoning hazard for other animals (gopher tortoises), lizards, snakes), which frequently seek shelter in burrows. The fumigation technique to control armadillos is usually chosen only if the burrow or den is located a short distance from the site of the damage. The armadillo is most likely to be using its den during midday and therefore this is the best time to use a fumigant or gas.

One fumigant that is easy to use, quite safe and effective is carbon disulfide. Carbon disulfide usually can be obtained at local farm-supply stores or possibly, the local drug store. This substance is best utilized by soaking a wad (softball-sized) of cotton or rags with carbon disulfide, and then placing the cotton or rags as far down the burrow as possible. Cover the den immediately with sod or heavy soil. Toxic fumes from this material will kill the armadillo (and sometimes, other animals) if it is inside the burrow. CAUTION: Do not use carbon disulfide near an open flame as it is a highly flammable material.

Carbon monoxide gas from internal combustion engines also can be used as a fumigant by attaching a hose to the exhaust, extending the other end of the hose as far into the burrow as possible, and closing off the entrance around the hole with compacted soil. Exhaust fumes should be expelled into the burrow for at least 20 minutes to kill the armadillo. This technique is not highly recommended since it also may result in a secondary poisoning hazard to other animals using the burrow.

Poison baits are not recommended; they are poorly accepted because of the armadillo's feeding habits and present another secondary poisoning hazard to other animals. One other method is frequently employed to control offending armadillos — and that is spotting them at night and shooting them. Make sure shooting is legal and safe in your area. The shot should be directed toward the animal's head, as these animals are difficult to kill otherwise. Remember that armadillo meat is edible if properly prepared and there is no bag limit or season on them.

If one of the above control methods is ineffective at discouraging or eliminating the offending armadillo(s), a combination of these will likely be more effective.

Scientist Defends Use of 2,4-D

The following is from a letter sent to the chairman of the Santa Cruz County board of supervisors about a hearing it held last October 30 on the possibility of banning use of 2,4-D. The board of supervisors voted to place a moratorium on the herbicide's use by the department of public works until additional information and testimony could be considered. Two more hearings were held, again with the same results. At the most recent hearing (December 11) the moratorium was continued until June at which time the county agricultural commissioner, county director of the extension service, and the department of public works have been asked to make recommendations on replacement herbicides and the "use of IPM in weed control." The writer is Dr. Kenneth Thimann who enjoys a worldwide reputation as a biologist, plant physiologist and bio-chemist. He is the possessor of a list of academic achievements and honors that is far too long to present here. The important thing insofar as this letter is concerned is that he is one of the world's true experts on the subject. — Editor

My name is Kenneth Thimann and I am professor emeritus of biology at the University of California-Santa Cruz. My speciality is plant biology and in particular the plant growth regulation substances (of which 2,4-D is one). I have written some 250 scientific papers and five books on this and related topics. I do not work for any firm that makes or sells 2,4-D (or indeed any other pesticide) and my sole interest in this matter concerns the truth.

2,4-D is the most generally useful of all herbicides. Its discovery arose from the work on natural plant hormones, to which it is related and not from the Army, as was claimed on Tuesday. This, by the way, was only one of some dozens of falsehoods to which I listened that evening. 2,4-D is the most generally useful herbicide because of three valuable properties: it is harmless to man, it is rapidly destroyed by bacteria in the soil (and to non-toxic breakdown products), and lastly it has the special ability to kill broadleaved plants (technically dicotyledons) without harming the narrow-leaved group (monocotyledons), a group that includes the grasses, wheat, barley, corn, rice, etc.

Thus it is most useful for killing weeds in corn or wheat; its use in Britain in the immediate post-war years is credited with causing a 30% increase in overall wheat yields. It has been in regular use throughout Europe and North America since about 1948; i.e. for 31 years, and in that time the only damage to humans ascribed to it, as far as I know, was to a few who deliberately drank it for suicidal purposes. Even then it has been hard to absorb a fatal dose.

It stands to reason, therefore, that the tiny amount one might take in from the spatter of a sprayer, etc., could not possibly exert a harmful effect. The man who claimed that, while working for the parks department he had sprayed some 2,4-D and the following day he "and all his team" had

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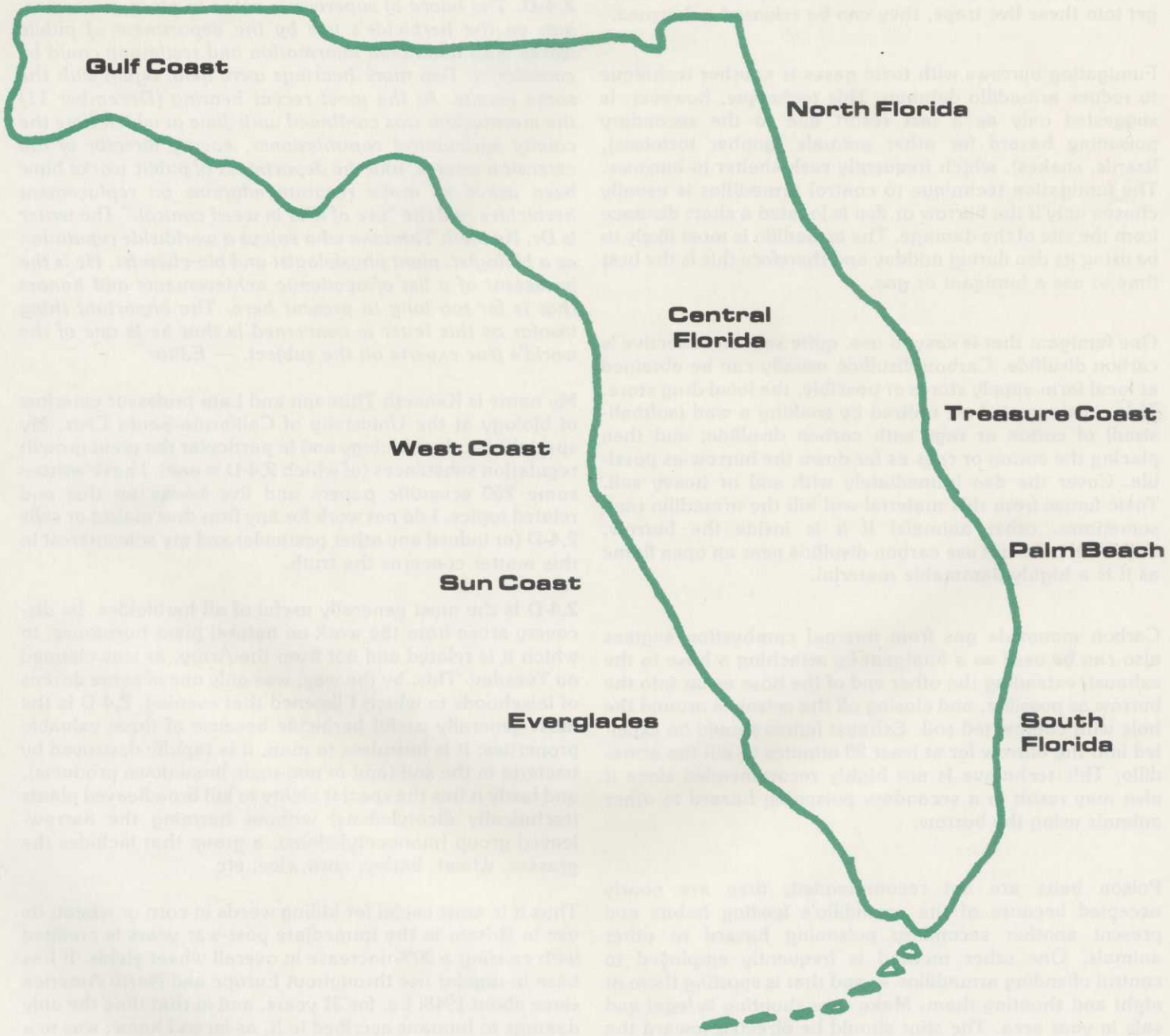

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been sick, was therefore either (a) making up a story, or (b) mistaken as to the pesticide he was using. Even with 2,4,5-T (which is more complex because of the toxic dioxin present as impurity), the dose required for the minimum effect is excessively high.

In the often-quoted Bionetics Laboratory tests, the minimum dose of the impure 2,4,5-T needed to cause minimum birth defects in mice was 45 milligrams per kilogram, and was given daily for half the duration of pregnancy. Scaled up to a woman of 60 kilograms (132 pounds) she would have to eat nearly three grams of the solid *every day* for four and a half months. In normal spraying solution this would require drinking about half a gallon daily for that period. Since the substance tastes most disagreeable no one in his or her senses would drink even a glassful, let alone take it daily for 135 days. And 2,4-D, which is our present subject, does not contain dioxin anyway.

One trouble with many of the witnesses is that they were unable to distinguish between one compound and another. One said 2,4-D and 2,4,5-T are "about the same," thus completely missing the point about the toxin in the latter. Others declaimed against "pesticides" in general. Now some pesticides are indeed toxic to humans. When EPA made the mistake of banning the insecticide DDT, farmers and others resorted to malathion and other organophosphates which *are* toxic, and these have accounted for over 60% of the hospitalized cases of pesticide poisoning in 1976-77. (Almost 25% more were persons who took the insecticide intentionally!) Thus if the board makes the same mistake with regard to 2,4-D some more toxic herbicide may well come into use.

Many statements made at the hearing were incredible. The representative of Friends of the Earth claimed that 2,4-D was carcinogenic, mutagenic, caused birth defects and other illnesses, not a word of which was correct. Indeed, the only thing she did say that was true was that it killed the leaves of an apple tree (since it is an herbicide this would be expected). I pay the board the compliment of assuming that its members are interested in the facts and not in such hysteria . . .

Asulam in St. Augustinegrass

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INTRODUCTION

St. Augustinegrass *(Tenotaphrum secundatum)* (Waltz.) Kuntze) is one of the most prevalent and economically important lawngrasses in tropical and semitropical areas of the world. In Florida, this grass comprises over 300,000 acres of turf including 46% of home lawns.

Atrazine has been used for almost two decades to control broadleaf weeds in St. Augustinegrass. However, grassy weeds are the most prevalent and difficult to control in this turfgrass. Currently, there are no practical means of post-emergent control of monocots by either chemical or mechanical means. Due to the long growing seasons, numerous applications of preemergent herbicides are required for nominal grassy weed control resulting in higher costs and sometimes injury to the turf, especially on lighter sandy soils.

Thirty-five experiments were conducted during 1975 and 1976 at the Agricultural Research Center at Ft. Lauderdale, Florida and other areas of the State to determine the effectiveness of asulam (Asulox®) for selective post-emergence control of established weeds in turf.

METHODS AND MATERIALS

Test areas included both clean and weedy turf sites, and mowed areas of weeds, alone. Varieties of St. Augustinegrass used in the testing included common, Floratine, Floratam, Bitter Blue and an experimental selection. Experiments were conducted during all seasons of the year to determine the effects of climate and photoperiod. Randomized complete block designs with 3 or more replications were utilized and plots varied in size from 1 to 3m in width and 6 to 83 meters in length. A soluble salt formulation of asulam containing 3.34 lb ai/gal was tested at rates of 1.00, 1.67, 2.00, 3.34, 4.00 and 6.68 lb ai/A delivered in 44-45 gallons per acre of water.

Asulam is a foliar absorbed, translocated herbicide. Applications were made without surfactants and surface irrigation was discontinued for at least 24 hours after application to allow for plant uptake.

Most plots were treated with single applications using a compressed air sprayer and fan jet nozzle tips mounted on a garden tractor unit. Combination treatments tested were applied as tank mixes with 2.00 lb ai/A of atrazine (80% WP) or 2.00 lb ai/A of MCPP (2.0 lb aiEC).

RESULTS AND DISCUSSION

Better than 80% control was achieved with asulam at 2.2 kg/ha on problem monocots including crabgrasses *(Digitaria* spp.), goosegrass *(Eleusina indica)*, bullgrass *(Paspalum supinum)*, and sandbur *Cenchrus incertus)*. In addition, significant suppression of bahiagrass (Paspalum notatum), common bermudagrass *(Cynodon dactylon)*, smutgrass *(Sporobolis poiretii)*, torpedograss *(Panicum Repens)* and crowfootgrass *(Dacyloctenium aegyptium)* was found at the 2.2 kg/ha rate with a single application. A 4.4 kg/ha rate gave 80% or better control of all the aforementioned grassy weeds growing in St. Augustinegrass turf. Control of weeds growing in turf was usually superior to that of weeds in a non-turf situation due to competition from the turf. Control of young and actively growing weeds was faster and more complete than with mature weeds. In addition, young weeds did not produce seed. Treatments made during winter months required 8-10 weeks for acceptable control while spring and summer treatments required about 4-6 weeeks.

Several species of broadleaf weeds were also selectively controlled by asulam at 2.2 kg/ha. These include creeping beggarweed *(Desmodium* spp.), Spanish needles *(Bidens bipinnata)*, mares tail or horseweed *(Erigeron canadensis)* and dog fennel *(Eupatorium capillifolium)*. The use of tank mixes of asulam plus atrazine of MCPP increased the spectrum of weed control without significantly increasing injury to the turf.

Injury to all varieties of St. Augustinegrass at the 2.2 kg/ha rate was negligible. A slight yellowing was noticeabe at about 3 weeks post-application but about 7 weeks post-treatment a more lush and intense color than in the untreated checks had occurred. At 4.4 kg/ha, yellowing was more noticeable at 3 weeks, but complete regreening again occurred and no actual injury to the turf was detected.

In general, turf which was maintained under healthy cultural practices including frequent mowing, irrigation and fertilization was less susceptible to herbicide injury, showed quicker recovery and accelerated weed kill by the herbicide.

Areas needing additional research include the effects of mulitple and split-applications, timing intervals for multiple applications, and combinations of asulam and other herbicides.

SUMMARY

Results from 35 experiments demonstrated the potential of asulam for the selective control of several species of monocotyledonous and dicotyledonous weeds in St. Augustinegrass. Susceptible weed species included crabgrasses, sandbur, paspalums, goosegrass, creeping beggarweed, Spanish needles and dog fennel.

Questions & Answers About Asulox®

Q. *What types of crabgrass are susceptible to Asulox® ?*

A. All varieties of crabgrass commonly found in Florida are susceptible to a single 4 to 5 pints per acre application of Asulox® .

Q. *What about using Asulox® on other bermudagrass varieties?*

A. Extensive testing has shown that common Bermuda, Tifgreen 328, and Tifdwarf varieties are susceptible to injury by Asulox® at the recommended rates for good weed control.

Ormond Bermuda is susceptible to Asulox® discoloration, particularly where accidental overlapping of spray occurs, and is therefore not recommended.

Q. *What rate of Asulox® should I use?*

A. Use 4 to 5 pints of Asulox® per acre.

Dilute Asulox® in 40-50 gallons of water per acre.

Don't cut the rate. You risk poor weed control..

Q. *When should I apply Asulox® ?*

A. Asulox® is a translocated herbicide which performs best when weeds are young and actively growing. Treatment of mature weeds (when seed heads have begun forming) will result in less than satisfactory control.

Asulox® is a foliar absorbed compound, and weeds should have sufficient exposed leaf surfaces when sprayed.

Q. *What about application equipment?*

A. It is essential that spray equipment be properly calibrated, and all spray nozzles on a boom be of uniform size and spray pattern.

Spraying in the early morning while dew is present will aid the operator in seeing where he has and has not sprayed.

Avoid overlapping. It is wasteful, and may cause undue turf injury.

Always turn off your sprayer when slowing, stopping or turning.

Q. *What about mowing?*

A. It is best not to mow turf for several days before treatment to insure good foliage on weeds for uptake of Asulox® .

Turf should not be mowed for at least 48 hours after Asulox® treatment to allow herbicide translocation into the plants.

Do not apply Asulox® to turf mowed less than 1″ in height as this turf is under stress, and can induce herbicide injury. (Do not treat tees or greens with Asulox® .)

Q. *What about irrigation?*

A. Do not irrigate turf for at least 8 hours after Asulox® treatment to allow for plant uptake.

Turf should be irrigated normally on subsequent days, and should not be subjected to moisture stress.

Q. *Is turf discoloration dangerous or unusual?*

A. Under certain conditions, a slight and temporary discoloration of the turfgrass may occur at 10-14 days after application. This is temporary, and does not adversly affect the turf.

Healthy turf is always less susceptible to herbicide injury. Turf under stress from lack of moisture, nutrients, disease, or insects should not be treated with herbicides.

Q. *Can I mix Asulox® with other chemicals?*

A. Do not mix Asulox® with other pesticides or fertilizers as these may inhibit its uptake or cause turf injury.

Do not use a surfacant with Asulox® as this reduces its selectivity and causes injury to the turfgrass.

Q. *How does Asulox® work?*

A. Don't expect overnight results since Asulox® is thoroughly translocated within the plant before it begins killing the entire plant.

Schedule of Asulox® action:

- Weeds cease growing and are no longer competing with turf
- Browning of weeds will become noticeable
- Susceptible weeds are nearly all brown
- Susceptible weeds are controlled

Guest Editorial

It was my opportunity at the recent Florida Turf Grass Association and Conference in Gainesville to present a check for $500.00 to the Scholarship and Research Fund of that association. The presentation was made in the name of the North Florida Golf Course Superintendent's Chapter. Our contribution, along with that of other chapters, clubs, businesses and the proceeds from the S & R Golf Tournament, totalled in the thousands of dollars.

Frequently, over the past years, the question of what we can do about EPA's systematic approach of removing our much needed chemicals from the market arises. Questions about how to afford fertilizing when the cost is so high, what we can do about the energy shortage and so on, have been and will continue to be discussed.

It appears to me that directing funds to scholarship and research hold the answer for us. With proper funding these people can find answers for us. Some of the problems that need to be addressed are: better mole cricket control, better grasses that need less fertilizer and less mowing, and better understanding of disease and other insect problems.

Many opportunities exist for channeling funds in this direction. At the recent conference one club contributed $450.00 by assessing itself .01¢ for each round of golf played in the last year. This in itself would not go far but it is an example for the rest of us. If 600 clubs did this it would amount to $270,000. Now that would do something!

It is time for us to quit waiting for someone to solve our problems for us. We have the mechanism for getting our problems solved if we can channel some much needed funds in that direction. Certainly discovery of better mole cricket control could save each of us thousands of dollars very quickly. The money for this research must come from those of us who stand to benefit directly from the discoveries.

Much discussion is needed on what should be a club's fair share but I think we should start in the $500.00 per year range per 18 hole course. That is not much money when you really think about what is at stake. In the long run it could make the difference between us continuing to be capable of providing golf quality turf or playing on cow pastures.

I challange each of you to give this some thought and discuss it with your management. If we can all come together on this we can control our destiny and we will not have to sit idly by and watch all of the tools we have to do our jobs with taken away from us with nothing to replace them.

Lewis C. Powell, Jr.
President
North Florida Chapter
Florida G.C.S.A.

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