

Sonar won't restrict you like other aquatic herbicides.

When used properly, the Sonar label does not restrict swimming, fishing or drinking. So there is no need to stop using your water after treating with Sonar.

Apply new Sonar whenever...

...weeds are a problem. In the spring, summer, or fall. Treat early and keep weeds away, or treat late and clear them out. Whenever they grow, just use easy-to-apply liquid or pellets.

Apply new Sonar wherever...

...water weeds grow. Golf course ponds.

Canals. Private lakes. Even large recreation lakes. Sonar is ready to go to work.

Apply new Sonar to water-spoiling weeds.

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**Gently restores nature's balance.**

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A Division of Eli Lilly and Company  
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Sonar®—(fluridone, Elanco Products Company)



# What aquatics experts have to say about new Sonar.

## Terry Westergard

Owner  
South Shore Fish Camp,  
Lake Orange, Florida

"Sonar controls weeds longer than mechanical harvesting and I've seen no adverse effects from it. And the fishermen like the fact that they are able to fish in places where they haven't been able to get into for a number of years. They enjoy it because it reminds them of what the lake was like before the hydrilla.

"Fishermen want to go out without worrying about burning up their engines, and be able to throw in a lure and catch a fish. This is what we had 10 or 15 years ago."

## Mike Mahler

Operations Coordinator  
Polk County Environmental Services  
(Florida)

"With Sonar, we were able to put the lakes back to the condition they were in before hydrilla came in. We've had some lakes that were virtually 100% surfaced out in hydrilla before we used Sonar. Now, it's rare to see hydrilla in those places.

"Sonar can be applied in the early spring or late winter, when our crews normally are idle. It's helped us catch the problem and knock it down before it becomes a problem.

"Most of our treatments ended up with more than 12 months of control. Contact herbicides give us about three months of control.

"On a per-acre, per-year-of-control basis, Sonar is cheaper than any other material."

## Will Davis

Executive Director  
Lake County  
Water Authority (Florida)

"If I had to say there was one big advantage to Sonar, it's very selective on the plants it controls.

"Hydrilla is our main problem, and Sonar is our primary chemical for treating it. With Sonar, we got 99% control on Lake Yale without retreating... and we're seeing a good influx of native plants to take the place of the hydrilla.

"We're getting much longer term control, which means we're putting a lot less chemical in the water. Every year that you don't get a regrowth makes a big difference in costs over the long run. There was no cost-effective method of getting a lake clean until Sonar came along. I don't know of a chemical on the market that can even come close to it."

## Paul Myers

President  
Applied Aquatics,  
Eagle Lake, Florida

"I was one of the fortunate few who was able to work with the product during its development stages. I was extremely excited about it because new aquatic herbicides are few and far between.

"With Sonar, we've gotten annual control with a single application in lakes and ponds. With contact herbicides, you can figure you're going to have to treat two to three times a year.

"Sonar is the most recent aquatic herbicide to be registered by the EPA and is the most highly scrutinized product in terms of toxicological testing. That's extremely important to homeowners."

## Get the new Sonar story.

Talk to the Elanco products distributor near you. Get all the details on how you can weed out your water, without the worry. With new Sonar.

**W**ith word from the University of Cincinnati that its "robot" lawn mower may soon have a manufacturer, other companies are being forced to constantly keep up with innovative developments in the mower industry. But trends outside of manufacturing—but within the green industry—also influence mower production.

"Customers, both golf course and lawn care, are becoming increasingly cost-conscious," notes Jeff Mack, Lesco's equipment products manager. "They will not, however, sacrifice quality to attain this goal. We also see a trend in the customer becoming more self-sufficient in the maintenance of his equipment, again with an eye toward controlling costs."

Many manufacturers cited cost-consciousness as influencing purchases.

"End users have begun to understand that there are false savings buying cheap products," says Lee Bouldin, marketing services manager for Gravely International. "It is much more economical in the long run to buy quality first."

"Industrywide, the very intense price competition will continue," notes Charles Berry, national sales manager for Ariens.

Berry names the development of front cutting mowers, high horsepower and wider cuts as influential changes in mower manufacturing. "We are emphasizing better bagging, quieter products, longer warranties and high power," he says.

"Time and cost efficiency are more in demand with a greater emphasis on quality of cut," says Timothy Phelan, manager of merchandising for Wheel Horse Products. "They want the same individual to be able to mow more grass in less time without sacrificing any quality in the cut."

Howard Day, vice president of sales for Yazoo, says rotaries will become even more popular as manufacturers develop easier handling equipment.

Jack Steinhour, advertising manager for Woods Division of Hesston, agrees that rotaries are becoming a viable alternative because maintenance costs are lower.

"There are greater demands by all users of mowing equipment for less frequent maintenance intervals, automatic clipping collection, best quality of cut possible, overall noise reduction and more attention to operator safety," says Clarke Staples, turf manager for Cushman.

### **Manufacturing's future**

John Kinhead, sales manager for Na-



**Mower manufacturing has been influenced by both social changes and industry trends.**

## **MOWER TRENDS**

Technology has influenced mower manufacturing. But perhaps bigger influences are the trends in golf course and landscape management.

*by Heide Aungst, associate editor*

tional Mower, says the formula is simple: "more production and more efficiency in production."

As for trends in manufacturing, Phelan says, "I believe there is a trend to more hydrostatic drives in the lawn and garden tractor area, while zero turning radius continues to grow in the commercial mowing machine marketplace."

"There is an increasing use of and demand for grass-catching equipment," adds Rick Bressie, director of communications for the Grasshopper Co.

Robert Martin, president of Exmark Manufacturing, says manufacturers will develop even more specialized equipment in the future.

Mower safety is a big issue in manufacturing says Pat Scholl, communications manager for the Alamo Group.

"Most of the trends in golf course/landscape management that have affected mower manufacturers have to do with the relationship between the machine and its operator, like operator convenience, operator safety, and

reducing operator time," says Chris Covert, director of administration and international operations for Simplicity Manufacturing.

"The growth of landscape contracting and maintenance business has led to the development of more versatile equipment capable of performing more than one function," says Jim Taylor of Heckendorn.

"The trend toward lower mowing heights on golf course fairways and greens is leading to more sophisticated mowers, more intensive turf maintenance," says James Byrnes, advertising manager for Jacobsen. Byrnes adds that improvements such as hydraulics for traction, implement drives and durable, economical diesel engines are becoming increasingly popular.

Dick Lehman, executive vice president for Ransomes, cites the desire of golf course superintendents and landscape managers to have lightweight mowing equipment as an influencing factor in manufacturing.

"There's been a growth in the fine turf industry," says Rich Jenks, adver-



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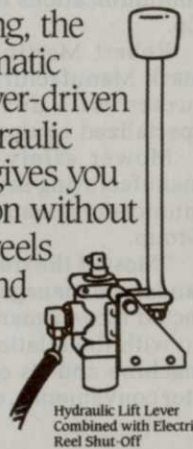
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tising supervisor for Deere and Co. "There's better maintained turf at golf courses, parks, playgrounds and athletic facilities. With that, I see an opportunity for John Deere to move in."

### Quality care

"We've seen our walk-behind mowers become popular with golf courses concerned with quality. They've gone back to walking greensmowers. It gives a superior cut, but they make a time sacrifice. Just this year we've seen interest in walk-behind mowing of tees also," says Mike Burch, advertising agent for Bunton.

G.C. Mitchell, marketing manager for Brouwer Turf Equipment, lists five popular mower features: low compaction, low fuel consumption, ease of operation, ease of service and repairing, and a reasonable price.

"As turf conditions vary from one marketplace to another, we strive to listen to our customers' needs worldwide, resulting in special design, engineering, and simplicity," Mitchell says.

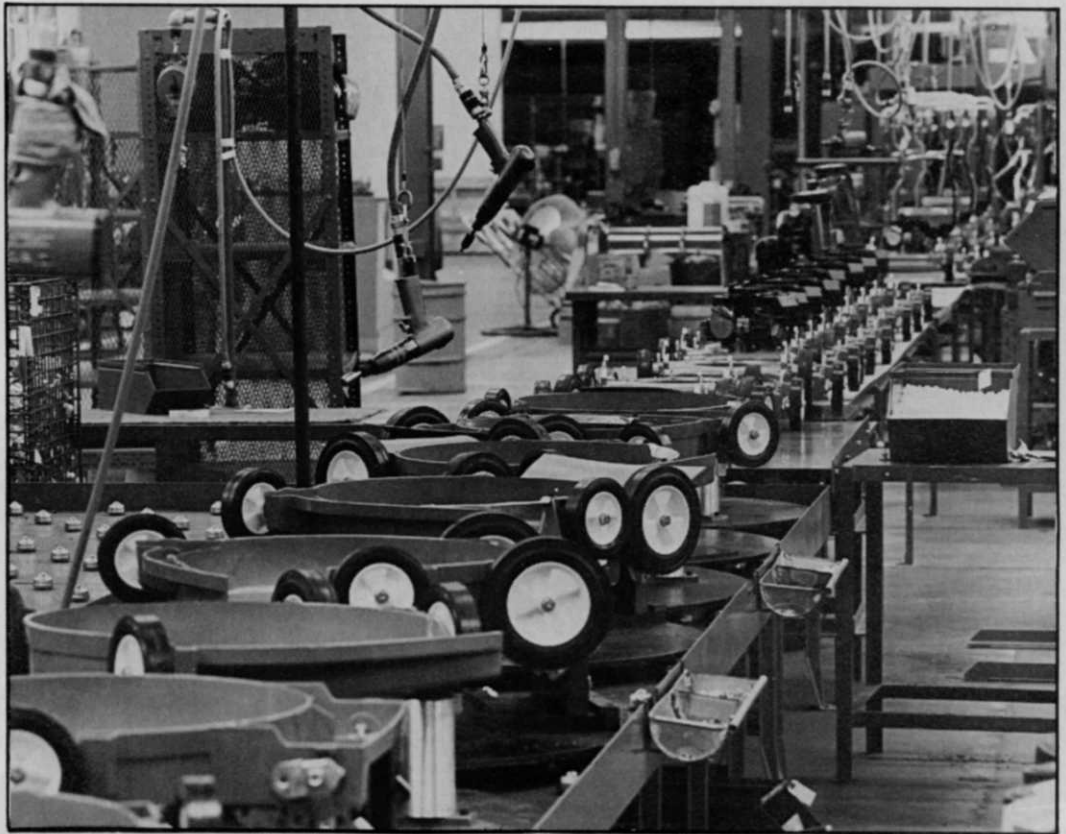
Jim Wright, marketing manager for the Grazer Division, Willsey-D, says mower changes have been caused by an increased dependency on commercial operators. "More residential areas are also becoming more dependent on commercial operators," he explains.

Mike Schaefer, vice president of F.D. Kees Manufacturing Co., feels the operator is looking for "quality performance in equipment which requires less down time."

Robert Martin, president of Exmark Manufacturing, says the landscape manager wants simply "more specialized equipment."

"Landscape management is growing rapidly and is going to be a very strong market in the future," says Kevin McGrath, president of Locke Manufacturing. "The golf course market is fairly stable."

"The commercial landscape market is increasing at a very, very fast pace compared to the rest of the power



Industry experts predict that robotics will influence manufacturing more than actual mowing.

equipment industry," agrees Betty Schwarz, customer service manager for Scag Power Equipment.

"The number of lawn care companies which have begun to mow grass has influenced manufacturing," says Don Weakley, Snapper's senior vice president for corporate development.

This growth in the lawn care and landscape markets translates into better sales for some companies. "We're expecting a five percent unit sales increase at least in 1987," says Mike Tomita, marketing coordinator for Kubota Tractor Corp.

### Society's influence

Changing patterns in society also have affected mower manufacturing. "The commercial business continues expanding as the population ages, people move from suburbs into apartments and condominiums, and ever-increasing park and green belt areas are being mowed," explains Dean Ziegenbein, product manager for Gilson Bros. "Users of mowing equipment are looking for faster cutting ability, less down time for maintenance, and lower cost for new replacement mowers."

"The fact that there are people out there trying to make a living by cutting grass puts pressure on manufacturers to produce equipment which is

durable and reliable," says Dave Welfelt, sales manager for Excel.

"The high initial cost of developed land, and the cost of maintaining green areas around new projects is creating a trend away from large turf areas and favors the use of a larger number of small landscaped areas," says Bob Walker, president of Walker Manufacturing.

Safety is another concern of mower manufacturers. Edwin Toolis, president of Vrismo Manufacturing, says the safety features and versatility of flail mowers make them better than rotaries.

"An increasing number of people seek more recreation facilities, the factor of operating safely becomes mandatory," says Howard Wilbrandt, director of marketing for the Mathews Company. "We believe flail mowing will be a requirement wherever people and mowing share the same turf simultaneously."

Bomford & Evershed marketing director E.A. McLaren says the key is to manufacture a flail mower which will reduce the frequency of cut.

One final trend worth noting: the use of rotary mowers for golf course greens. "Before, there were never rotaries on the course," notes manufacturer Howard Price. "But we're selling a number of rotaries with 72- to 180-inch cuts for use on roughs."



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Photograph Courtesy NASA

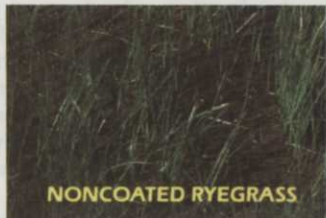
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The dandelion is a winter broadleaf weed which can be treated with 2,4-D.

## AFTER THE FACT

If your pre-emergence weed control didn't work, here's a guide to the post-emergence choices.

### WARM-SEASON

by Euel Coats,  
Mississippi State University

**P**ost-emergence herbicides are applied after weeds have emerged. Post-emergence herbicides act either by contact or after absorption and translocation (systemic).

Contact herbicides act rapidly, while translocated herbicides usually require several days for their phytotoxic action to be observed. Translocated types usually kill the entire plant, whereas contact herbicides kill only the contacted part of the foliage.

Best results will usually be obtained with post-emergence herbicides if plants are young and actively growing, and the air temperature is above 70 degrees Fahrenheit. Foliar applied herbicides are less effective if the soil is dry.

Consult the herbicide label for the optimum growth stage and environmental conditions needed to obtain the best results with a given herbicide. Surfactants are frequently rec-

ommended for use with post-emergence herbicides. For consistent results, use non-ionic agricultural surfactants sold specifically for use with herbicides.

Warm-season turfgrasses vary in their susceptibility to post-emergence herbicides. However, it is possible in most cases to discuss bermudagrasses and zoysiagrasses as a group and centipedegrass and St. Augustinegrass as a second group similarly in herbicide tolerance.

Many herbicides that can be used on bermudagrasses and zoysiagrasses cannot be used on either centipedegrass or St. Augustinegrass. Weed problems in warm season turfgrasses occur both in the growing and dormant seasons.

#### Winter grass weeds

Annual bluegrass is by far the most severe grassy weed infesting southern turf areas during the late warm growing season, through the dormant period, and into the early part of the next growing season. This weed occurs in all turf environments, especially in moist soils. Aside from decreasing the aesthetic value of turf, the primary objection of annual bluegrass in southern turf is the onset of other

weed problems associated with the rapid die-back of annual bluegrass in late spring.

Bermudagrass coverage of bare spots is usually slow following fade-out of annual bluegrass, leaving sections of the soil surface exposed. Weeds tend to germinate in bare areas.

A particular problem is goosegrass, which is usually difficult and expensive to control.

Pronamide application made as early as November or as late as April will give annual bluegrass control in dormant turfs. Ideally, treatment should be made prior to seed production to reduce next year's seed source. Application prior to seed production is also early enough for effective annual bluegrass control while not interfering with the transition of bermudagrass. The earlier a dense bermudagrass canopy develops, the more competitive the turf will be with summer weeds.

Another approach employed on many golf courses is to use a post-emergence application of a non-selective herbicide such as paraquat or cacodylic acid prior to the breaking of bermudagrass dormancy. This usually does an excellent job on annual



bluegrass, as well as any annual broadleaf weeds present.

However, injury is often encountered if application is delayed until the bermudagrass begins breaking dormancy. The degree of injury is dependent on the amount of green foliage present at the time of application.

### Winter broadleaf weeds

Important broadleaf weed species include: common chickweed, henbit, clovers, mouseear chickweed, lawn burweed (spurweed), dandelion, wild onion, wild garlic, plantains, speedwells and others.

Henbit, chickweed and clovers dictate that something other than 2,4-D be used for post-emergence broadleaf weed control.

In dormant bermudagrass and zoysiagrass, Banvel or a two- or three-way herbicide combination containing Banvel are usually used.

The phenoxy herbicides are safe on completely dormant turfs. Actively growing turfs vary considerably in their tolerance to phenoxy-type materials.

St. Augustinegrass will usually tolerate 0.5 lb/A of 2,4-D with only minimal injury if the air temperature is below 80 degrees Fahrenheit. This may not seem important when using phenoxy on dormant warm-season turfs, but invariably application is made at various stages during spring transition.

Turfgrasses are more susceptible to phenoxy injury during this transition period.

The combination of mecoprop plus chlorflurenol is often used by homeowners, especially in St. Augustinegrass lawns. Wild garlic is a major perennial weed problem in many warm season turfs during the cool growing season.

A fall application followed by a spring application of 2,4-D for three or more years has been used for wild garlic control with varying degrees of success. Image, a new herbicide recently labeled (1987) for use in turf has shown potential for more effective control of wild garlic than 2,4-D, and should contribute significantly to more effective management of wild garlic.

### Summer grass and sedge weeds

Crabgrass and dallisgrass invade more turf acreage in the southern United States than any other grass. Post-emergence control of these two weeds, especially crabgrass, can be accomplished in centipedegrass with Poast.

In St. Augustinegrass, an applica-



Henbit, chickweed and clover (pictured here) dictate that something other than 2,4-D be used for post-emergence broadleaf weed control.

tion of Asulox will give reasonably good control of crabgrass and certain other annual grassy weeds. In bermudagrass and zoysiagrass, control can be achieved with MSMA, DSMA or CMA. In fact, dallisgrass control in bermudagrass and zoysiagrass relies heavily on these herbicides.

MSMA plus metribuzin plus surfactant gives good post-emergence control of goosegrass. Two applications of MSMA (2 lbs/A) plus metribuzin ( $\frac{1}{16}$  lb/A) plus 1 quart of non-ionic surfactant per 100 gallon tank mix applied seven days apart will generally give excellent control of even mature goosegrass.

Remember, the methane arsonates can be used only on bermudagrass and zoysiagrass. Other grass weed problems in southern turfs include sandbur, bahiagrass, crowfootgrass and torpedograss.

Sandbur and bahiagrass can be controlled with methane arsonates, although several applications may be required.

No means of selective control of torpedograss in any southern turf species has been developed.

Both annual and perennial sedges are problems in the southern United States. Purple nutsedge and, to a lesser extent, yellow nutsedge, are the most severe problems. Yellow nutsedge can be controlled with Basagran. Roundup will control nutsedge when used as a site preparation aid.

Image, in addition to controlling wild garlic, will also control purple and yellow nutsedge, as well as many annual sedges.

Although broadleaf weeds are a problem throughout the southern

United States in turf, no species appears to reach the level of infestation equivalent to that of the summer grasses.

Among the more important summer broadleaf weeds are prostrate spurge, prostrate knotweed, yellow woodsorrel, Virginia buttonweed and Florida betony.

### Summer broadleaf weeds

As a group, they are rather difficult to control. Multiple applications of a two- or three-way hormone mixture are necessary for effective control and repeat treatments are often needed.

From our limited experience with some members of the group, we generally observe that the use of a good agricultural grade surfactant is warranted when applying a hormone herbicide.

A mixture of 2,4-D plus dichlorprop has given equal or better post-emergence control of Virginia buttonweed than other hormone herbicide mixtures in our research trials in 1984, 1985 and 1986.

We have observed that the level of Virginia buttonweed control can be increased an additional 15 to 20 percent if a pre-emergence herbicide, such as oxadiazon or Princep, is applied at the same time a post-emergence application is made. The increase attributable to the pre-emergence herbicide appears to be due to reduced regrowth or reinfestation of Virginia buttonweed from seed.

### Cool season turfgrass weeds

Weed control technology for cool season turfgrasses overseeded into warm season turfs (bermudagrass) is somewhat limited. The small acreage has not justified the expenditure of re-

sources by university researchers. Also, chemical companies have been reluctant to label their herbicides for this use due primarily to the limited acreages and high financial risk involved.

Nevertheless, fair to good control of weeds in this turf situation can usually be achieved.

Annual bluegrass control in overseeded golf greens may be accomplished with Prograss. Prograss will control annual bluegrass when applied either pre-emergence or post-emergence. However, Prograss is recommended only for post-emergence control in overseeded golf greens, and further only to greens overseeded to a monostand of ryegrass or blend of ryegrass. Prograss may also be used to control annual bluegrass in overseeded turfs.

Safety to perennial ryegrass dictates that it be used as a post-emergent. One or two applications are needed, and the first application should be made 30 days after overseeding (bermudagrass dormant). The follow-up application should not be made after the date specified on the label. It appears that the safe use of Prograss is limited to the northern part of the bermudagrass belt.

Unless the bermudagrass is completely dormant at application, significant delays in growth from dormancy to actively growing bermudagrass can occur.

Disadvantages of Prograss may involve both the bermudagrass and the ryegrass. If bermudagrass is not dormant when the initial application is made, delays in transition are sometimes observed the following spring.

If the second application is made too late, significant delays in spring transition are also observed. Additionally, Prograss can be used only on ryegrass.

Consequently, overseeding mixtures containing creeping bentgrass, red fescue or rough bluegrass cannot be planted when Prograss is used for



Common chickweed tolerant to 2,4-D, necessitates the use of other materials.

annual bluegrass control.

Broadleaf weed problems in overseeded turf are quite variable. A number of the common winter annual broadleaf weeds found throughout the southern United States during the dormant season may or may not be a problem in overseeded turf.

Henbit, common chickweed, clovers, spurweed and mustards are among the more important of this group. Competition from the overseeded turf would seem to hold infestations down significantly. When a herbicide is needed, henbit, common chickweed and (or) clovers usually dictate the herbicide(s) that will be used.

These weeds are fairly tolerant to 2,4-D, necessitating the use of other

"phenoxy type" materials. In general, Banvel or a phenoxy-Banvel mixture are recommended for broadleaf control where these weeds are present.

Banvel or Banvel mixtures appear to be the most widely used for control of these weeds. Numerous two-way mixtures of Banvel and 2,4-D formulations exist on the market. These and the three-way mixtures Trex-San or Trimec are probably used more than Banvel alone. Weed-B-Gon for Southern Grasses, which is a mixture of mecoprop and chlorflurenol, is also used to some extent by homeowners. In overseeded greens where lawn burweed (spurweed) is the problem, Buctril or Brominal is a very effective and safe herbicide to use. **LM**

## COOL-SEASON

by John R. Hall III, Virginia Polytechnic University

**P**ost-emergence herbicides most commonly include materials utilized to selectively control broadleaf weeds, annual grassy weeds and sedge-type plants after they have germinated or emerged. However, this category can also include non-selective materials that are used in renovation for total plant kill prior to seeding.

The most commonly utilized cool-season turfgrass broadleaf herbicides include materials such as 2,4-D, 2,4-DP (dichloroprop), mecoprop (MCP), dicamba and bromoxynil. Annual grassy post-emergence weed control in cool-season turfgrass is achieved with materials such as DSMA (disodium methane arsonate), MSMA (monosodium methane arsonate),

MAMA (monoammonium methane arsonate), CMA (calcium methane arsonate) and fenoxaprop-ethyl.

The arsonates have also been shown to be moderately effective for control of yellow nutsedge in cool-season turfgrasses. However, bentazon has provided more effective long term control with less injury to the desirable cool-season turfgrass.

Glyphosate has proven to be the most effective renovation herbicide where total kill of the existing stand of grasses and weeds is desirable. Soil