TURF

restricted by excess moisture or compacted soils.

Soil applied—long term residual—selective and nonselective herbicides will provide total vegetation control for several months. They are used primarily for rights-of-way and peripheral weed control along fences and buildings. They last too long for turf renovation and may move laterally in the soil to various degrees.

Bromacil(Hyvar) and borate compounds are just a few examples. Several mixtures of these and other compounds for quick foliage kill, such as amitrole, are available.

Extreme care should be taken when applying these herbicides near desirable plants.

Conditions are key to herbicide effectiveness

Most herbicidal failures aren't failures of the herbicide. They are the result of using herbicides without full consideration of the conditions which make them most effective. These conditions include temperature, moisture, timing, application method, and characteristics of the target weed.

To be most effective, herbicides must be applied at the appropriate time in relation to germination or growth of the target weed species and in the right place.

In turf, postemergence herbicides are applied directly on the target weed and preemergence herbicides are applied to the soil.

Since most herbicide applications are made on established turf, it may appear preemergence herbicides are applied to the foliage. In fact, they must be washed off the foliage and down to the soil to be effective, either by supplemental irrigation or rainfall.

With postemergence herbicide applications, irrigation or rainfall is detrimental since the herbicide needs to cling to and be absorbed by the weed foliage.

Preemergence applications should be made before weed seed germinates and should last throughout the germination period to be effective. They do not have any effect on established weeds. Their action is exerted only after the seed germinates and growth commences.

Theoretically, preemergence herbicides form a chemical barrier between the weed seed and the soil surface. Therefore, they must be applied uniformly to the soil prior to germination to be effective. A critical threshold concentration of preemergence herbicide must be maintained in the soil throughout the germination period. Preemergence herbicides with short soil residual may require split applications to maintain the critical concentration.

Dry soil severely reduces the effectiveness of preemergence herbicides unless moisture is added soon after treatment.

Postemergence applications are applied to the weed foliage following germination and emergence. They act either as contact or systemic (absorbed and translocated) herbicides.

Contact herbicides act rapidly while systemic herbicides usually require several days to produce visible results. Systemic herbicides usually kill the entire plant while contact types only kill the foliage contacted by the herbicide.

Postemergence herbicides are most effective when applied to young, actively growing plants when the temperature is above 70 degrees F. Foliar applied herbicides are also less effective if soil is dry.

Surfactants are frequently recommended for use with postemergence herbicides. For consistent results use nonionic agricultural surfactants, sold specifically for use with herbicides.

SHOW HIM THE VERY BEST WAY TO CONTROL DISEASES.

What do you want?

The most effective disease control?

Or the most economical disease control?

Don't compromise. Get both with strong, long-lasting CHIPCO® 26019 turf fungicide...now the leader in turfcare by a healthy margin.

CHIPCO 26019 is Strong Medicine.

Turf managers rely on CHIPCO 26019 because nothing is more effective against turf's most damaging diseases: Helminthosporium Leaf Spot and Melting Out, Dollar Spot, Brown Patch, Fusarium Patch and Blight, and Pink and Grey Snow Molds.

CHIPCO 26019 Lasts Longer...So It Costs Less To Use.

CHIPCO 26019 gives tough control...21 days on greens and tees, and up to 28 days on fairways.

SHOW HIM THE VERY BEST WAY TO CONTROL COSTS.

So for every treatment you can eliminate, you're saving money—up to $10 per acre in just fuel and labor.

That means CHIPCO 26019 is more cost-effective than lower-priced fungicides that need multiple applications.

Go With The Best On Greens, Tees And Fairways.

For the highest performance on fine turf and the lowest cost on fairways, make CHIPCO 26019 the cornerstone of your spray program.

Ask for it and other fine products in the CHIPCO Line at your local dealer.

Rhône-Poulenc Inc., Agrochemical Division, Monmouth Junction, NJ 08852.

RHÔNE-POULENC

CHIPCO® 26019

EVERYTHING'S UNDER CONTROL.

Please read label carefully and use only as directed.

TURF

Herbicide selection

Since the growth of the professional lawn care industry, the choice of turf herbicides and formulations has increased. Two or more herbicides may be equally effective in a given weed situation. Also, the same chemical may be available in a variety of commercial formulation trade names.

Selection of a herbicide and formulation is determined by:

- the weed species involved
- the availability of the herbicide
- type of equipment at your disposal
- time of application
- your budget for weed control
- precautions needed to limit exposure to desirable plants, humans, and animals, and
- residual of the product.

All recommended rates of application are based on either active ingredient or acid equivalent. Commercial products may have the same herbicides but have different percentages of active ingredients. The label will provide the exact amount of herbicide in the container. It is wise to figure the price of a product on the basis of its active ingredient or acid equivalent.

For example, a herbicide is available in liquid formulations varying from six to less than one pound acid equivalent per gallon. Usually, the more concentrated products are more economical on a per pound basis.

Granular formulations of many herbicides are also available. In comparison to sprays, granular herbicides have both advantages and disadvantages.

The advantages are simpler application—no water or mixing required, less drift, and a tendency toward longer activity in the soil.

Disadvantages of granular herbicides are difficult calibration of application equipment and slightly higher cost.

The range of concentration, particle size of product, and varying rates of application complicate calibration. More concentrated materials are usually more economical but calibration errors are more critical. Calibration charts are supplied by manufacturers of granular applicators. Application equipment should be calibrated prior to intitial use each season and periodically checked during the season. This will ensure safe, effective and economical control.

Weed control strategy for warm season turf

Bermudagrass is the dominant turf species in warmer climates. In general, herbicides that can be used on bermudagrass can be used safely on zoysiagrass.

continued on page 58

Tolerance of turfgrasses to preemergence and postemergence herbicides in Alabama - R. Dickens

	PREEMERGENCE									POSTEMERGENCE										
Established Turf	Oxadiazon	Siduvon	Pronamide	Benefin	DCPA	Napropamide	Bensulide	Atrazine	Simazine	ASU/AM	MSMA, DSMA CAMA	2, 4-D	Dicamba	Glyphosate	Mecoprop	Paraquat	Dichlorprop	Dalapon	Bromoxynil	Benfazonn
Warm Season																				
Bermudagrass	T	S	T	T	T	T	T	I	I	I	T	T	T	D	T	D	T	S	T	T
Zoysiagrass	t	-	I	T	T	-	T	T	T	S	T	T	T	D	T	D	T	S	T	T
Centipedegrass	s	-	I	T	T	T	T	T	T	S	S	I	I	D	I	D	I	S	-	T
St. Augustinegrass	T	-	I	T	T	T	T	T	T	T	S	I	I	D	I	D	I	S	T	T
Bahiagrass	-	-	-	T	T	T	T	O-S	I-S	S	I-S	T	T	D	T	D	T	S	-	T
Cool Season																				
Tall Fescue	t	T	S	T	T	T	T	S	S	-	T	T	T	S	T	S	T	S	T	T
Red Fescue	s	T	S	T	T	-	T	S	S	-	I	I	I	S	T	S	T	S	T	T
Kentucky Bluegrass	t	T	S	T	T	-	T	S	S	-	T	I	I	S	T	S	T	S	T	T

T Tolerant.
I Intermediately tolerant; use herbicide with care.
S Sensitive; do not use this herbicide.
D Dormant grasses tolerant to this herbicide; will kill growing plants.

NOTE: Some of the above combinations show a tolerance rating although such usage is not currently labeled.

YAZOO BIG WHEEL.
Engineered for tough mowing.

Give your crew the Yazoo Big Wheel—designed to work best under tough conditions. Built for heavy-duty, pro-longed commercial use, the Big Wheel is balanced for easier handling. Raise the cutting deck to cut high grass with almost no effort because the engine's weight is balanced over the big drive wheels.

Because the engine is behind the cutting deck, it cuts right down to the water's edge while operator and drive wheel stay high and dry. Cuts grass under fences, branches and shrubs that most mowers can't reach. Belt drive protects from damaging shocks to the engine in case the blade hits obstructions.

Dependable 5 H.P. or 8 H.P.

Briggs & Stratton/Wisconsin engines with cast iron cylinder sleeves, provide the power for your Big Wheel. For industrial grade components, designs that help your crew work faster and longer than average, it's clear that the smart mower investment is a Yazoo Big Wheel.

YAZOO

Yazoo Manufacturing Company/P.O. Box 4449/3650 Bay Street/Jackson, Mississippi 39216/Phone (601) 366-6421/Telex 504-150

Quality commercial mowers since 1945.

DISTRIBUTORS

ALABAMA/GEORGIA
AUTO ELECTRIC AND CARBURETOR, INC.
2625 South 4th Avenue/
P.O. Box 2246
Birmingham, Alabama 35201
(205) 323-7113/(800) 292-4099
Attn: George Reed

CANADA
BROUWER TURF EQUIPMENT, LTD.
Woodbine Avenue
Keswick, Ontario, Canada L4P3E9
(416) 476-4311/Attn: G. J. Brouwer

NORTHERN TWO-THIRDS OF ILLINOIS, IOWA, MINNESOTA, NEBRASKA, NORTH DAKOTA, SOUTH DAKOTA AND WISCONSIN
CENTRAL DISTRIBUTING COMPANY
Route 45-54-24 East
Gilman, Illinois 60938
(800) 435-0949/Illinois (800) 892-0929
Attn: Marion Roberts or Gerald Kreeb

EASTERN AND CENTRAL KENTUCKY, OHIO
MID-EAST POWER EQUIPMENT COMPANY
P.O. Box 658
Lexington, Kentucky 40586
(606) 253-0688
Kentucky (800) 432-9523
Ohio & Tennessee (800) 354-9565
Attn: John Spence

NORTH CAROLINA, SOUTH CAROLINA, VIRGINIA AND WEST VIRGINIA
PORTER BROTHERS, INC.
1005 East Dixon Blvd.
Shelby, N.C. 28150
(704) 482-3424/Attn: Chuck Bolt

NEW YORK
JOHN REINER CO., INC.
946 Spencer St./Syracuse, NY 13208
(315) 474-5741

CONNECTICUT, DELAWARE, MARYLAND, NEW JERSEY, PENNSYLVANIA, RHODE ISLAND AND BERMUDA
JOHN REINER CO., INC.
145 Commerce Road/Carlstadt, NJ 07072
(201) 460-9444/Attn: George Gale

MAINE, MASSACHUSETTS, NEW HAMPSHIRE AND VERMONT
DIESEL ENGINE SALES
199 Turnpike St./Stoughton, MA 02072
(617) 341-1760

SOUTHERN ILLINOIS, INDIANA, WESTERN KENTUCKY, MISSOURI AND MICHIGAN
TRI-STATE EQUIPMENT COMPANY
345 Leitchfield Road
Owensboro, Kentucky 42301
(800) 626-8444/Attn: Jim Hargan

FLORIDA, PUERTO RICO, BAHAMAS
YAZOO OF FLORIDA
3440 Edgewater Drive/P.O. Box 7516
Orlando, Florida 32854
(305) 843-1093/Attn: W. W. Baxter

ARKANSAS, LOUISIANA, MISSISSIPPI, TENNESSEE
YAZOO MFG. CO., INC.
3650 Bay Street/P.O. Box 4449
Jackson, Mississippi 39216
(601) 366-6421/Attn: Howard Day

ALASKA, ARIZONA, CALIFORNIA, COLORADO, HAWAII, IDAHO, KANSAS, MONTANA, NEVADA, NEW MEXICO, OKLAHOMA, OREGON, TEXAS, UTAH, WASHINGTON AND WYOMING
YAZOO OF TEXAS
1409 Telephone Road
P.O. Box 18677
Houston, Texas 77223
(713) 923-5979/Attn: Gene Branch

Circle No. 181 on Reader Inquiry Card

Dr. Ron Wilson and Dr. Roger Cahoy, of PBI/Gordon, show George Toma a lab experiment dealing with the eutectic characteristic of Trimec®. Toma is the groundskeeper at the Truman Sports Complex in Kansas City, which visiting media people have said is one of the most beautiful in the world. He uses Trimec in his weed control program and calls it the most efficient weapon in his arsenal.

Would you like to join George Toma in satisfying his curiosity about Trimec®?

TURF HERBICIDE

Every turf professional who has ever asked *why* ... or *why not* ... will enjoy eavesdropping on this visit with George.

Anyone who spends any time around George Toma becomes aware of his insatiable curiosity. He's never satisfied to just know *what* a product will do. Rather, he wants to get inside of it and find out *why* and *how* it does it.

It was this type of curiosity that led him into a study of pre-germination of rye grass, which in turn makes it possible to reseed damaged turf and play football on it 10 days later.

And it was this same curiosity that enabled him to envision a plan which involves putting turf over an artificial surface on Saturday; playing soccer on it Sunday; and then returning the field to artificial surface on Monday.

So none of us at PBI/Gordon was surprised when George Toma asked if we would let him get inside of a Trimec molecule so he could see "what makes Trimec tick."

"I guess just about every herbicide salesman in the world has brought us samples," grins Toma. "We've tried them all, and it's obvious that you folks at Trimec know something the others don't. As a matter of fact, we have never found a broadleaf weed that Trimec won't control."

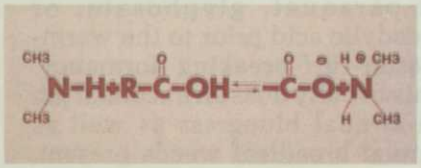
"Certainly the active ingredients in Trimec are no secret," Toma continued. "But can you tell me *what* in the world happens, and *why* it happens when

these ingredients become Trimec?"

(Gosh, George, you might as well ask us if we have any pictures of our grandchildren.)

In two words, it's synergism and eutectics:

Here is the Trimec formula



As you can see, it is a formulation of Phenoxy Acetic, Phenoxy Propionic and Benzoic Acid herbicides. At PBI/Gordon, the three acids are reacted to form a new compound. The resulting Trimec product is synergistic in that it has more power than the sum of the three acids individually.

Use of the eutectic principle causes the total complex to resist crystalization for a longer period of time than any of the components individually. Of course, the longer a herbicide can resist crystalization the better chance it has to penetrate the cuticle of the weed and translocate throughout the entire root system to result in total kill.

An explanation of eutectics

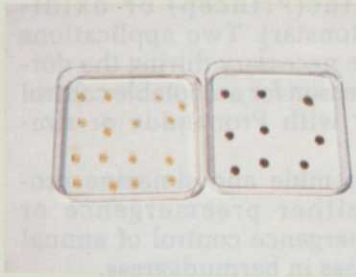
THE EUTECTIC PRINCIPLE
IN COMMON SOLDER ALLOYS

Composition at %						Melting Range, °C
Sn	Pb	Cd	Bi	Ag	Sb	
100						239
	100					327
63	37					183
62	36			2		179
15.5	32		52.5			95
13	27	10	50			70

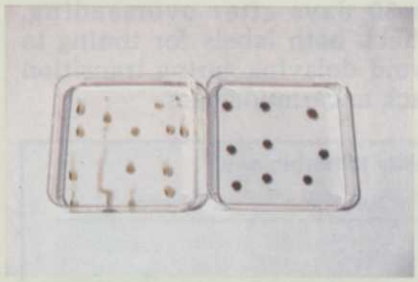
Perhaps the clearest demonstration of the eutectic principle can be found in common solder alloys, which consist primarily of tin and lead. Notice that 100% tin melts at 239 degrees Celsius. 100% lead melts at 327 degrees. But an alloy of 63% tin and 37% lead melts at 183 degrees. And note that by adding 2% silver the solder alloy will melt at 179 degrees.

In our laboratory we learned that we could utilize the principles of eutectics to delay crystalization of the Trimec complex in much the same way that eutectics can change the melting point of solder.

Visible proof of eutectics in Trimec



The drops on these two petri dishes were 5 hours old when photographed. Notice that the 2, 4-D on the right has started to crystalize, while the Trimec on the left has not.



Here is the dramatic effect of the eutectic principle. After a full week, the dishes are tilted and the Trimec is still in a liquid state and will actually flow down the dish while the 2, 4-D has crystalized into a solid state.

"Okay, for a long time I've known *what* Trimec will do. And now I know *why* Trimec does it," said Toma. "Now I want to know *how* you do it."

(We're all set to reveal that secret the day after Coke® tells Pepsi®, or vice versa.)

George Toma at Arrowhead with an experimental model of palletized turf, which would be the basic building block of removable turf that could be layed over an artificial surface; played on; and then removed. Even turf grown in a pallet contains weeds, so Toma sprays it with Trimec.

T.M.

Beware of substitutes. Look for the Trimec Seal on broadleaf herbicides, brush killers, and weed-and-feed fertilizers.

YOUR GUARANTEE OF A TRIMEC® COMPLEX PROFESSIONAL QUALITY

pbi/gordon corporation

1217 WEST 12th STREET
P.O. BOX 4090
KANSAS CITY, MISSOURI 64101
(816) 421-4070

TRIMEC® is a registered trademark of PBI/Gordon Corporation. U.S. Patent No. 3,284,186.

TRIMEC®

TURF HERBICIDE

589-184

Circle No. 154 on Reader Inquiry Card

TURF

from page 54

However, special attention should be paid to herbicide labels regarding applications to centipedegrass and St. Augustine, which are similar to each other in their tolerance to herbicides.

Winter grass weeds Annual bluegrass is by far the most severe grassy weed infesting southern turf areas during the late growing season, through the dormancy period, and into the early growing season.

Beside decreasing the aesthetic value of turf, the primary objection to annual bluegrass is its rapid dieback in late spring. Bermudagrass coverage is usually slow following fade out of annual bluegrass leaving large sections of bare ground exposed. Other weeds, such as goosegrass, tend to move into bare areas.

Annual bluegrass control with preemergence herbicides is usually accomplished with either benefin(Balan), bensulide(Betasan), DCPA(Dacthal), Pronamide(Kerb), simazine(Princep) or oxidiazon(Ronstar). Two applications may be necessary during the dormant season for acceptable control except with Pronamide or simazine.

Pronamide and simazine provide either preemergence or postemergence control of annual bluegrass in bermudagrass.

There are two choices for annual bluegrass control on bermudagrass greens overseeded with perennial ryegrasses. Bensulide may be applied prior to overseeding. Ethofumesate(Prograss) may be applied 15 to 30 days after overseeding. Check both labels for timing to avoid delaying spring transition back to bermudagrass.

Broadleaf weed susceptibility to herbicides[1,2]

Weed	2,4-D	Mecoprop	Dicamba
Mustards	S	I	I-R
Nutsedge	I	R	R
Onion, wild	I	R	S-I
Ornamental plants	S-I	S-I	S
Oxalis (woodsorrel)	R	R	I
Pennycress	S	I	S
Pepperweed	S	S-I	S
Pigweed	S	S	S
Plantains	S	I-R	I-R
Poison ivy	I	R	S-I
Ponyfoot (dichondra)	S	I	S-I
Purslane	I	R	S
Red sorrel	R	R	S
Shepherdspurse	S	S-I	S
Speedwell	I-R	I-R	I-R
Spurge, prostrate	I	I	S
Spurge, spotted	I-R	S-I	S-I
Spurweed	S-I	I-R	S
Thistle, musk, curl	S	I	S
Thistle, Canada	I	I	S
Vegetables	S	S	S
Wild carrot	S	S-I	S
Wild strawberry	R	R	S-I
Wild violet	I-R	R	—
Yarrow	I	I-R	S
Yellow rocket	S-I	I	S-I

S = weed susceptible; R = resistant weeds; I = intermediate, good control at time with high rates, sometimes poor, usually require more than one treatment.

Another approach employed particularly on golf courses, is to use a postemergence application of a nonselective herbicide such as paraquat, glyphosate, or cacodylic acid prior to the warm-season turf breaking dormancy. This usually does an excellent job on annual bluegrass as well as annual broadleaf weeds present. Injury is often encountered if application is delayed until the bermudagrass starts breaking dormancy. The degree of injury is dependent on the amount of green foliage at the time of application.

Winter broadleaf weeds Important warm-season winter broadleaf weeds include common chickweed, henbit, clovers, spurweed, mouse-ear chickweed, lawn burweed, common dandelion, wild onion, wild garlic, plantains, and speedwells.

Preemergence control of some species can be obtained with benefin, bensulide, DCPA, simazine and other herbicides.

Henbit, chickweed, and clovers usually require something other than 2,4-D for postemergence control. In dormant bermudagrass and zoysiagrass, dicamba or combinations with dicamba are used often for postemergence control.

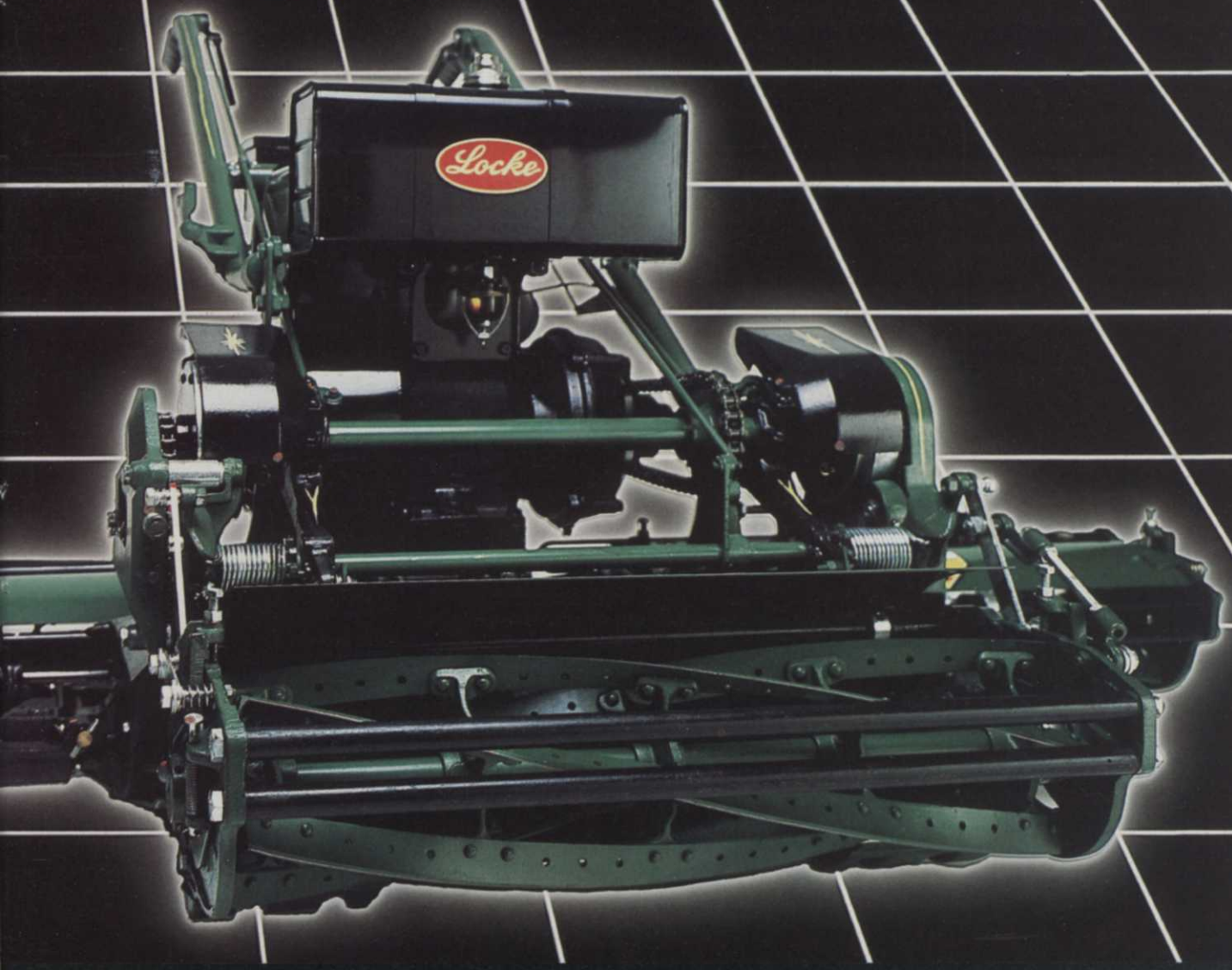
The phenoxys are safe on completely dormant turfs. Actively growing turfs vary considerably in tolerance to phenoxy materials.

St. Augustine will usually tolerate a .5 lb/A of 2,4-D with only minimal injury. At rates above .5 lb/A, St. Augustine is usually injured. This may be unimportant when using phenoxys on dormant warm-season turfs, but invariably application is made during spring transition. All turfgrasses are more suceptible to phenoxy injury during this transition period. The combination of mecoprop plus chlorfurecol is often used, especially by the homeowner on St. Augustine.

Summer grass weeds Large

continued on page 62

THE ULTIMATE MOWING MACHINE



Driven by the conviction that performance is the ultimate justification for owning a mower, Locke makes the best mowers for lawn-care professionals who demand performance, quality, and value. In a time when some manufacturing standards are questionable, Locke has made no cost-cutting changes in the manufacture of its mowing machines since their introduction in 1928. From cast iron Briggs & Stratton engines to forged steel frames and spring-loaded reels, Locke mowers are built to endure.

Locke mowers deliver a cut the others have yet to match, a precision cut with each blade of grass cut cleanly at a uniform height, unlike the ragged finish of a rotary. Cutting a wider path than a rotary, and with a ground speed equivalent to most rotaries, the Locke is almost fifty per cent more productive. And it goes on delivering this productivity over a life that is decades longer than that of a rotary. The choice becomes simple, either buy a rotary every few years, or invest once in a Locke.

To find out more about Locke's 1984 line visit your dealer or write for additional information.

It's time you owned the ultimate mowing machine.

Locke

Professional Quality Reel Mowers

Circle No. 227 on Reader Inquiry Card

Contact Locke today for your local authorized dealer—
(203) 333-3157—1100 Boston Avenue, Bridgeport, CT 06610