WEEDS and TURF

OCTOBER 1963

Monthly news for contract sprayers of weeds, turf, ornamentals, and trees

1963 Chemical Suppliers Guide Issue
page W-18

HSAF Meet Features Wide Interest Range . . . W-33

Florida Turfgrass Group Breaks Record . . . W-35

Complete Manual of Aquatic Weed Control Begins This Month . . W-8
JOHN BEAN:
CHOICE OF CUSTOM OPERATORS

John Bean leads the way when you “spray for pay”. You select from four basic sprayer series... plenty of choice to let you get size, type, capacity and price just right for your needs. Bean Bond lined tanks and lifetime Sapphite cylinders assure long, trouble free service. Trailer-type, skid-mounted or PTO models. Wide choice of accessories. Versatility unlimited: weed and brush control, turf spraying, applying liquid fertilizer, shrub and tree spraying, root feeding, dust abatement, row crop spraying. To be sure sprayday is payday, get the facts on John Bean high-pressure sprayers.

CHOOSE FROM FOUR BASIC SERIES

“ROYAL” SPRAYERS—25 to 60 GPM, pressures to 800 p.s.i., 200 to 1000-gallon tanks.
“ROYALIER” SPRAYERS—15 to 20 GPM, pressures to 400 p.s.i., 200 to 500-gallon tanks.
“ROYALETTE” SPRAYERS—5 to 10 GPM, pressures to 400 p.s.i., 50 to 300-gallon tanks.
“TROJAN & SPARTAN” SPRAYERS—Mobile, push-type. 3 GPM, 60 p.s.i. (Trojan) or to 300 p.s.i. (Spartan)
CONSULT
THE
LEADER
IN
SOIL FUMIGATION

DEVELOPERS AND FORMULATORS OF
WEEDFUME • PATHOFUME B • TRIFUME

CONTROL

• MOST WEEDS
• GRASSES — INCLUDING NUTGRASS, BERMUDA-
  GRASS, AND JOHNSON GRASS
• NEMATODES
• SOIL-BORNE INSECTS
• CERTAIN SOIL DISEASES INCLUDING
  DAMPING-OFF ORGANISMS SUCH AS
  PYTHIUM, FUSARIUM AND RHIZOCOTONIA
• SCLEROTIA OF SCLEROTINIA ROT
• VERTICILLIUM WILT

Automatic Application of Polyethylene Sheeting During Large-Scale Soil
Fumigation Has Facilitated the Treatment of Areas as Large as 500 Acres

NEIL A. MACLEAN CO. INC.

EQUIPMENT • MATERIALS • TECHNICAL SUPERVISION

HOME OFFICE • BELMONT, CALIF.
(San Francisco Area)
1536 INDUSTRIAL WAY,
LYtel 1-2671

SEATTLE, WASHINGTON
423 S. Horton St.
Main 4-1774

TUCSON, ARIZONA
110 E. 6th St.
Main 2-3331

PHOENIX, ARIZONA
120 W. Jackson St.
Alpine 3-3101

FRESNO, CALIF.
752 "H" STREET
AMhurst 6-6389

EL MONTE, CALIF.
(Los Angeles Area)
9846 E. ALPACA ST.,
Cumberland 3-8841

HONOLULU, HAWAII
1169 Mona
Phone 3-2766

WEEDS AND TURF Pest Control, October, 1963
Use **Trithion**® insecticide for lawn chinch bug control. Chinch bugs are small sucking insects that feed on the juice in leaves and stems of grass, causing brown patches and eventual death of infested lawns. Chinch bug destruction is a growing problem around the country . . . but a problem you can solve for your customers with Trithion.

Since 1960, thousands of lawns have been treated with Trithion. Results have been spectacular!

**Trithion** gives quick, positive control. It's a fast-acting compound that controls **all** chinch bugs, including those strains that have become resistant to other materials.

**Trithion** is easy to handle safely. It is less hazardous to handle than many other organic phosphorus pesticides. **Trithion** is an easy-to-apply emulsifiable liquid . . . and also is available in granular form.

**Trithion offers one-shot control . . . that lasts.** Repeat sprays are rarely needed with **Trithion**—“one-shot control” stops chinch bugs. Its long residual action means long-term protection . . . with resulting reduced costs.

Use **Trithion** on your customers’ lawns. Remember—**Trithion** keeps the grass greener on their side of the fence . . . and on yours, too! For details, write Stauffer Chemical Company, Agricultural Division, 380 Madison Avenue, New York 17, N.Y.
October, 1963

Features
Guide to Suppliers of Weed and Turf Chemicals .. W-18
HSAP ’63 Convention Program Like College Course in Its Diversity ....................... W-33
Importance for Turfmen of Scientific Knowledge Demonstrated by Record Florida Conference Attendance .................................. W-35

Departments
Calendar ........................................ W-33
Know Your Species .......................... W-36
Trimmings ...................................... W-38

Published Monthly by TRADE MAGAZINES, INC.
1900 Euclid Avenue Cleveland, Ohio 44115

JAMES A. NELSON
Publisher
CHARLES D. WEBB
Editor
DAVID E. SCHNEIDER
Staff Biologist
R. J. HOFFER
Circulation Manager

Advertising Representatives
National Headquarters
1900 Euclid Avenue
Cleveland, Ohio 44115
Phone: Area Code: 216 + 771-4169
New York City
Billingston & Ficks
420 Lexington Avenue
Phone: Area Code: 212 + LExington 2-3667

Single Copies: 35 cents
Annual Rate for 12 Monthly Issues: $3.00

Speak up now!

Applicators of chemicals for weed control and turf and tree maintenance are currently being swamped with legislation.

From the far corners of the country, with increasing frequency, this magazine receives reports that contract applicators face more and more restricting laws about the use of chemical pesticides.

Astute industry observers will no doubt agree that once the pesticide question caught the public eye, such a rush of new laws was to be expected.

What is alarming to veteran applicators, however, is the fact that too many of the new restrictions are being recommended without consultation with the people who really understand all aspects of the pesticide problem. Who is better qualified to speak about the use of pesticides than the contract applicator who makes his living in constant proximity to the compounds some people fear?

We do not doubt that most critics of this chemical age are well-meaning folks who are unduly apprehensive or just misinformed. Some “authorities,” qualified in their own fields, may not have the last word on the real or imagined dangers of pesticides. A skilled MD with a good bedside manner is not necessarily a toxicologist.

Because of the danger of unqualified guidance, we recommend that every applicator make himself heard in town hall forums, in state hearings, through local papers, and everywhere possible. Laws meant to govern CAs should not be passed without the good counsel of the governed.

There was once a revolution fought on these shores because a people refused to be taxed without fair representation. It would indeed be a sad comment on the industry if educated, experienced leaders fail to speak up now, in order to give lawmakers a truly proper perspective.
why settle for HALF the pest control business you can handle?

A booming demand for weed control and turf spraying has hit most areas. Pest control operators jumping into the weed and turf field to meet the demand find the market promising—and profitable. YOU can branch out into this "other half" of the pest control business, and make money doing it, with the help of T-H Malathion.

BRANCH OUT WITH T-H MALATHION!!

You know T-H Malathion as a potent killer of flies, mosquitoes, ants, and most other flying and crawling insects. You know T-H Malathion is easy to apply and safe to use. Well, T-H has increased the usefulness of T-H Malathion by offering it to you in several formulations which are highly effective for control of plant aphids, mealybugs, spider mites, bagworms, tent caterpillars, and other insects which infest ornamental shrubs and lawns. Malathion applied as a dust, wettable powder, or spray, is safe to use—it's low toxicity presents no hazard to man or animals.

Low-toxicity T-H Malathion presents no hazard to man or animals. Long-lasting T-H Malathion is now available in a new low-odor grade, too! Send for complete information on T-H Malathion for use in weed and turf service, or simply ask your man from Philips Roxane. Special formulations for use on shrubs and lawns are T-H Malathion E-5, 25 W, and Dust No. 5.

PHILIPS ROXANE
THOMPSON-HAYWARD CHEMICAL CO. Kansas City 41, Mo.

SALES OFFICES & WAREHOUSES:

CHICAGO, ILLINOIS
COLLEGE STATION, TEXAS
DALLAS, TEXAS
DAVENPORT, IOWA
DENVER, COLORADO
DES MOINES, IOWA
GREENVILLE, MISSISSIPPI
HOUSTON, TEXAS
INDIANAPOLIS, INDIANA
KANSAS CITY, MISSOURI
(GENERAL OFFICE)
LITTLE ROCK, ARKANSAS
LLANO, TEXAS
LUBBOCK, TEXAS

MEMPHIS, TENNESSEE
MINNEAPOLIS, MINNESOTA
MOBILE, ALABAMA
MUNDAY, TEXAS
NATCHITOCHES, LOUISIANA
NEW ORLEANS, LOUISIANA
OKLAHOMA CITY, OKLAHOMA
OMAHA, NEBRASKA
PECOS, TEXAS
SAN ANTONIO, TEXAS
SHREVEPORT, LOUISIANA
ST. LOUIS, MISSOURI
TULSA, OKLAHOMA
WICHITA, KANSAS
Here’s how!!!

With **CHLORDANE** and this new chart, you can control over 70 lawn, garden, and household pests!

**CHLORDANE** is so well established as the leading termite control chemical that you may not realize how many other uses it has. It kills lawn insects, pests of trees, shrubs, ornamentals, vegetables and fruits. It kills all common household insects. Chlordane can also be used for pre-emergence crabgrass control. And for all of these uses, you can depend on Chlordane’s quality, economy, handling ease, and unmatched safety record. To help you take advantage of Chlordane’s versatility, we’ve prepared a special chart that tells when, where, and how to use it. Included are recommended dosages and complete conversion and dilution tables. You’ll find this chart an invaluable “how-to-do-it” aid for your servicemen. Send for a copy today!

VELSICOL... interested in your success!

---

**New!**

**BANDANE** for CRABGRASS CONTROL!

If you want a pre-emergence crabgrass control that combines effectiveness with safety to established turf, use new Bandane. Bandane stops crabgrass before it starts, but will not “burn” or “thin” desirable grasses. It can be applied to new lawns, too, right after seeding. For complete information, request folder No. 526-5.

*Trademark Velsicol Chemical Corp.

---

When Writing to Advertisers Please Mention WEEDS AND TURF
MAN IS in conflict with nature at almost every turn. This fact is no less true in his use of natural or artificial water bodies. In smaller lakes and ponds, where there is no wave action or water level variation to prevent vegetation from running rampant, there is a natural progression from open water to shallow water, through various stages of vegetation, to a swamp or marsh stage. This, in turn, leads to a bog condition, and finally back to land.

This observable pattern takes many years to complete, but each year, vegetation whittles away at waters man finds useful. Gradually the progression, if not stopped by man's ingenuity, will steal the carefully cultivated usefulness of lakes and ponds.

Lakes are harnessed for food, recreation, transportation, flood control, electrical power, and water supply. Other waters, such as canals and ditches, are used for irrigation, drainage, and transportation. Aquatic weeds in these waterways annually cost millions of dollars, money which is spent to forestall, halt, or set back nature's progression that aims to create land where water is.

At other times, outbreaks of aquatic plants destroy the usefulness of existing waterways. When an alien plant, such as waterhyacinth, is released into new surroundings favorable to its growth, it multiplies rapidly and spreads over many acres of water surface. In these cases, man must attempt to correct nature's imbalance, or suffer the losses caused by weed growths.

Markets for aquatic weed control exist all over the United States. To accommodate these markets with service, chemicals, and information, competent applicators must know more about the aquatic environment and plants they want to control. This three-part series will deal with aquatic plant biology and identification, chemicals used for control, and application equipment and techniques.

Aquatic World is Unique

An aquatic environment is a different world from that which is familiar to man. Weeds must be destroyed selectively; desirable animals and fish inhabitants must live. To deal with an aquatic environment, a new set of factors must be considered in addition to plant species: biological factors (waxy cuticle on leaves), pH (acidity or alkalinity), hardness (mineral content), or organic content, currents, control period (when plants are killed most easily), to name just a few. These factors will be mentioned as they arise in the discussion.

Most logical sequence for a study of aquatic weed control starts with the organisms. Knowledge of the form and function of pest plants makes them easier to control.

For general background, certain terms will have to be defined. Plants are usually divided into two arbitrary groups: higher and lower. Higher plants are thought of as more advanced on an evolutionary scale. It is generally assumed that some plants came from ancient seas when land became habitable. The flowering habit evolved on land. Since higher plants have flowers, and some aquatic plants have flowers, they are thought to have been evolved from plants which formerly lived on land and readapted to water after developing the flowering-seed habit.

Lower plants are those which never left water in the course of their development. Algae are the most widespread representatives of this group.

Lower plants, which do not flower, have a vegetative growth pattern. Some lower plants, such as algae, grow by cell division; each two new cells are exactly like the original. There are other groups of lower plants which have more advanced growth patterns and unusual methods of reproduction.

Higher aquatic plants, since they are derived from land plants, have similar life cycles. They sprout from seeds, grow to maturity, develop flowers, and produce seeds. Some of the more troublesome aquatic weeds are perennial plants.

Perennials are long-lived, higher plants which resprout each year from tubers, underground rhizomes, and runners.
zomes, or stolons (rootlike stems); seeds are not necessary to carry on the species, but contribute to the spread of perennial weeds. Weeds which choke waterways with thick, matted growth are often perennials.

**Second Grouping System**

A second grouping system used by aquatic plant experts is a separation with respect to how weeds are found in the water, for this often determines the control method to be used.

If plants are found completely under water, they are called *submersed aquatic plants*. This distinguishes those plants naturally found under water from those which are submerged when flooded or inundated.

Plants found protruding significantly from the water, such as cattail, are called *emersed aquatic plants*.

Floating weeds, such as water-hyacinth and duckweed, which are not rooted but may protrude above the water line, are called *surface aquatic*, or *unattached-floating plants*. Species which are rooted and have an "anchored" leaf or "pad" are called *attached-floating aquatic plants*. Some variation may be found if authors wish to designate whether emersed parts have leaves, flowers, or branches.

To describe where aquatic plants are found, we can use a division from ecology (Odum, 1959). Of three zones of a lake, *littoral* (marginal or closest to shore), *limnetic* (served by sunlight but over deep, open water), and *profundal* (beneath the limnetic; not furnished with light), the first, littoral, is the most important. It is in shallow littoral zones where all rooted and most floating vegetation is found. Where the littoral zone may be affected by rising and falling water lines, some "amphibious" plants may live both on land and in water (Hall, 1961).

After the plants are placed and different growth habits defined, one can concentrate on specifics about aquatic plant pests.

There are 25 families covering some 185 species of plants classed as aquatic weeds. This article will include habits, identification, and distribution of the most important of these families. Names of species are in accord with the Report of the Terminology Committee of the Weed Society of America (1962). First to be considered are those emersed species with parts protruding above the surface.

**Cattails Are First Invaders**

A most familiar emersed species is cattail, *Typha spp.*, family Typhaceae (family suffix -ceae; tie fay' sea ee). Cattail is found throughout the United States, and is easily recognized by its tall, slender leaves, and tannish-brown flower spike. Cattail is usually the first rooted vegetation to invade shallow margins of a man-made farm pond; it grows in any wet place where its airborne seeds may land and germinate. Cattail colonies are formed from a fast-spreading underground root system. These stems and roots catch and hold soil firmly and begin to fill in pond margins and drainage canals. A stand of cattail can significantly reduce the perimeter distance of a pond in a short time. Cattail is found in fresh water, but will tolerate brackish waters of coastal marshes. (Muenscher 1944).

**Bulrush Not Rush**

Another slender-leaved emersed species is bulrush, *Scirpus spp*. *Scirpus* is a member of the sedge family, Cyperaceae; it is not a true rush. Bulrushes are generally characterized by rounded or three-angled stems. Insides of stems are solid, contrasted with true rushes which have round and hollow, or nearly hollow, stems. The point where a leaf joins the bulrush stem is covered by a leaf sheath.

Many bulrushes are tall, 3 to 5 feet above water, sprouting from sturdy rootstocks. Reproductive parts are nutlike or conelike seeds borne near the end of an erect shoot. Seed clusters may sit directly on the naked stem or may hang on a branched spikelet, depending upon the species.

Two species of bulrush are especially troublesome across the United States, hardstem bulrush or tule, *Scirpus calidus*, and great or softstem bulrush, *Scirpus acutus*. Both have solid circular stems and spikelets (seeds) borne on a branch or panicle, as it is called. Groups of nutlike spikelets of hardstem bulrush are ovate or rounded, while softstem bulrush has spikelets more pointed or lanceolate. A small portion of the main stem extends above seed clusters in both species.

There are many other species of bulrush distributed throughout the United States. They are recognized by a rounded or triangular stem, sheathed leaf
species have limp leaves which float on top of the water; others stand up, typical of reedlike species. The character of burreed which serves for identification is the bur-type seed borne on an erect, leafless, crooked stem. Parts of female flowers persist to form stiff hooks on seed clusters; this gives burreed its name, although it is not generally like a reed.

GIANT REED, Phragmites communis, is the true reed of marshes, lakes, and ditches. It is a perennial with hard, jointed, erect stems. Roots are coarse and scaly. Giant reed may grow to a height of 12 feet and be topped with the large feathery head of seeds. Growth is often so thick and hedge-like that access to the water is hindered (Klingman, 1961).

The time of chemical application which will give maximum control is an important factor when dealing with Giant reed. When giant reed, which usually grows on land, becomes inundated with water, it becomes particularly resistant to herbicides which normally control it. The control period, or time span within which the weed can be more easily controlled, is significantly reduced.

Alligatorweed, Alternanthera philoxeroides, is a native which was imported from South America. It is prominent in the Gulf States, and southeast coastal areas. Alligatorweed is a hardy weed which grows well as a floating, rooted, or dry land plant. Plants on land or rooted in shallow water arise from relatively stout rootstocks. Plants in floating mats have only fibrous roots arising from stem joints. Stems are erect, with opposite leaves at regular intervals. Leaves are long, tapering to a point (lanceolate); leaf edges are smooth. Many tiny white flowers are on a spike (spadix) which is enclosed in a wraparound leaf (spathe). Alligatorweed has three distinct leaf veins radiating from the petiole attachment. One vein goes to the tip, the other two go to the basal points (arrow bars). Secondary veins branch off horizontally from the midrib. Margins of alligatorweed are sometimes wavy or uneven.

Pickerelweed, Pontederia cordata, is another erect emerged species which has arrow-shaped leaves. In the family Pontederiaceae, of which waterhyacinth is also a member, pickerelweed, with exposed purple flowers, is distinguished from alligatorweed when flowering. When not in flower, leaves of pickerelweed differ in that there is no main vein or midrib. All veins originate at the petiole attachment and travel singularly to the tip. Veins are curved into the lobe portions of this "arrowhead."

Most familiar genus in the waterplantain family, Alismaceae, is arrowhead or duck potato, Sagittaria spp. Arrowhead is common and widespread throughout the country.

Flowers of arrowhead are distinctive. They are borne on a tall stalk, usually in groups of three about a stem. Flower structure is simple; there are three small, white, or sometimes pink, petals. Several groups of three will be found at different levels on the erect stem. Stems of waterplantains are fleshy and have a milky juice. Although leaf shape varies from one species of Sagittaria to another; (some are broad; others very slender), they retain an arrowhead shape. At times species have two different kinds of leaves on one plant; one kind above water and one below. Submerged leaves are usually slender and ribbonlike.

Venation will help distinguish Sagittaria from other "arrowhead" plants. Veins of Sagittaria are parallel, similar to those of terrestrial plantains. There is no strong midrib; veins which supply nourishment to basal lobes are branches of those which run to the tip. Sagittaria is considered a valuable food plant for waterfowl, and is often introduced into a lake for duck food (Fassett 1960). Ducks
relish the tuberous roots of some species of arrowhead, hence the common names of duck potato or swamp potato are used in some parts of the country.

Water smartweed, *Polygonum amphibium*, is a member of the buckwheat family, Polygonaceae. The quickest way to confirm identification of a smartweed, when a pink, white, or greenish flower spike is seen along with alternating lanceolate leaves, is to check the jointed stem. If there is a sheath or stem extension at the base of each leaf petiole covering each joint or node, it is a *Polygonum*.

Smartweed species are generally distributed over the United States.

Waterprimroses, *Jussiaea* spp., are members of the evening-primrose family, Onagraceae. Waterprimrose is a rooted emergent genus. Species of waterprimrose (*J. repens* var. *glabrescens*, *J. californica*, and *J. grandiflora*) form mats of vegetation due to the air-holding capacity of stems. Roots are embedded in marginal shallow areas, and vast mats spread outward from the shoreline. Leaves are willowlike; long and slender. Flowers have 5 yellow petals, and are borne in the axils of leaves. The fused petals form a long tube connecting the flower stalk with the open petals. The ovary is long and slender and produces many seeds. Waterprimrose has an underground stem which sends up new shoots intermittently.

Waterwillow, *Justicia (Dianthera) americana*, (An alternate Brazilian *elodea* (*Elodea densa*)

Submersed Weeds: Anathema To Boaters, Swimmers, Fishermen

Submersed aquatics are the second group of important weeds. These weeds usually grow entirely under water, but leaves may reach the surface when growth is dense. They may or may not be rooted. Submersed aquatics do not have enough supporting tissue in their stems to maintain an erect posture out of water. Many submerged species do develop short flower stalks which may extend above the water surface for fertilization. This is an ephemeral occurrence and reproductive parts usually bend into the water after pollination.

Submersed weeds are the most troublesome group of aquatic plants that occur in irrigation and drainage ditches. Underwater weeds clog waterways, collect silt, and reduce flow to agricultural fields under irrigation.

One of the most common submersed aquatics is *Elodea (Anacharis)* spp., sometimes simply called waterweed. Since waterweed is such a nondescriptive term, we shall refer to this weed as elodea. Elodea is a favorite "seaweed" for use in goldfish bowls. Although it is normally rooted, it is easily fragmented and can survive as a floating plant or plant parts. This factor is important when controlling weeds of this sort. Chaining and plowing do not kill it, but merely spread the infestation.

Elodea is normally found in calcareous or hard water, water which contains dissolved calcium minerals. It grows rapidly, frequently branching from nodes. Each node is represented by a
whorl (circle) of leaves described as straplike, relatively long and flat. Often the stem grows to such a length that it breaks, and sends out new roots to become established in another place. Vegetative propagation is the prominent means of reproduction, although elodea does reproduce by seed. Sometimes male and female flowers are found on the same plant. Flowers are small and inconspicuous, found growing near stem tips. While developing, the flowers grow on slender filaments to the surface where pollination may take place.

There are two common species of Elodea. Most widespread is Elodea canadensis, American elodea. This native North American plant became a pest of waterways in Europe soon after it was introduced there.

Elodea densa, Brazilian elodea, is a large species introduced from South America. It is commonly used in aquaria and outdoor pools. It has adjusted to the wild and is now found throughout North America. As the name suggests, leaves grow in a dense whorl around the stem.

Watermilfoils “Smother” Oysters

Another troublesome weed of inland lakes and coastal flats is watermilfoil, family Haloragidaceae, genus Myriophyllum. There are about 20 species of this important aquatic weed. Stems of watermilfoil are not greatly branched; leaves occur either in whorls or are alternate on stems. Leaves are finely dissected (featherlike) or branched.

One very important pest species, parrotfeather, Myriophyllum brasiliense (proserpinacoides), was introduced from South America. It is common along streams, brooks, drainage and irrigation ditches. Reproductive structures and foliage of parrotfeather protrude above the water. It is a pest along the east coast, in Florida and California. Beds of watermilfoil have been known to be so thick that herbicide granules could not penetrate the mat of weeds.

Various watermilfoils have adapted to different water types. No single general statement can be made regarding water and its relationship to milfoil. Some are adapted to hard water and are usually found over a limestone bed. Others are found in noncalcareous waters, and one imported species, eurasian watermilfoil (M. spicatum), has adapted to living near the sea in water intermediate in salt content between sea water and fresh water. In these areas, heavy stands of eurasian watermilfoil interfere with oyster farming by killing young oysters and hampering harvesting operations. Thick mats impede water movement, reduce microscopic oyster food, and lower water oxygen content (Steenis and Stotts, 1961). This weed is also a pest in some inland waters.

All watermilfoils are basically alike in that they have very fine, feathery leaves. They are all “rooted” to the bottom by a weak horizontal underwater stem from which new plants sprout.

Coontail, Ceratophyllum demersum, is a notorious member of the family Ceratophyllaceae. Coontail is found in every state in the country. It will be found in lakes and ponds where there are sufficient nutrients and organic matter. Wherever it grows, it is usually a plentiful and dominant species. Recognized by the stem with whorled leaves which bears a resemblance to the tail of a raccoon, coontail has fine forked, pointed leaves. Each leaf in the whorl radiating from the stem has “teeth” or barbs along one edge. This characteristic identifies coontail readily. Coontail appears olive green when viewed through clear water.

Coontail has no roots but is often found with its basal stalk embedded in soft mud early in
ORTHO® is Proud to Announce
A New Aquatic Weed Control
that Really Works!

ORTHO DIQUAT

Public officials, ranchers and crop growers have long felt the need for a potent weed-killer practical enough for large-scale control of aquatic weeds. A weed-killer that was not toxic to wildlife and livestock when used according to directions. One that wouldn’t contaminate the soil or cause contamination when treated water was used for irrigation. One that was economical, and easy to apply. New DIQUAT, recommended by many agricultural agencies, represents a successful solution to these problems.

Fast kill on a wide variety of weeds. DIQUAT is highly soluble, and moves in quickly for the kill. (Much faster, for instance, than 2,4-D.) Weeds absorb it rapidly, then wilt, collapse and die. And the kill covers a wide range of aquatic weed pests: waterlettuce, waterfern, water hyacinth, elodea, southern naiades, pondweed — in fact, preliminary tests show DIQUAT to be effective against at least 22 of the more common aquatic weeds.

Low hazard, and non-contaminating. (Used as directed.) DIQUAT greatly reduces hazards to applicators, wildlife, etc., when properly used as recommended. Residue contamination is not a factor, as DIQUAT does not build up in water, and is inactivated immediately on contact with soil.

Hundreds of practical applications. Because of its proven effectiveness and inherent safety, DIQUAT has a wide variety of possible applications. It can be used to control weeds in canals, lakes, drains, and ponds. In parks, or on farms or ranches, it can be used for drainage and irrigation ditches, ponds, marshes, and swamps.* DIQUAT is also an excellent non-selective control for weeds and grasses around buildings and along fences, ditch banks and roadways.

*Note: As with many chemicals, water treated with DIQUAT should not be used for swimming or drinking purposes until ten days after application. And since it is a herbicide, allow ten days before spraying, irrigating or other uses of treated water.

A special word to Municipal Officials: It goes without saying that you can’t make an important policy decision on the basis of one advertisement. But we believe that the technical data available will convince you that DIQUAT can provide safer, more effective and more economical weed control. Why not get the full story, by writing: C. E. Cody, National Sales Manager, Agriculture, California Chemical Company, Ortho Division, 200 Bush St., San Francisco, Calif.
the growing season. Late in the summer, mats of coontail will float on the surface and drift with wind and water currents. This weed may collect in one portion of a pond or lake and make it entirely unusable for recreational purposes (Hiltibran, 1961).

An aquatic weed which could, at a hasty glance, be taken for coontail is Cabomba caroliniana or fanwort. Cabomba is classed by some as a member of the water-lily family, Nymphaceae. It, too, grows entirely submersed. Close observation reveals that leaves are finely divided, but are more fanlike and blunt tipped. They do not have "teeth," as does coontail. Leaves are attached oppositely to the stem rather than in whorls; they are covered with a gelatinous slime, typical of some waterlilies. Cabomba grows entirely under water except from May to September when the plant sends tiny white flowers to the surface along with tiny peltate (shield-shaped) leaves which give a clue as to waterlily kinship.

**Sago is Toughest Pondweed**

Next on the list of submersed aquatic weeds are the pondweeds, *Potamogeton* spp. Most widely known and toughest to control is sago pondweed (*Potamogeton pectinatus*). Found in nonacid waters (neutral to alkaline, pH 7 or above) in all states, sago pondweed is responsible for blocking flow in thousands of miles of irrigation ditches.

Sago pondweed is a limp, rooted species which bends freely in moving water. Leaves are rounded in cross section, threadlike, taper to a point, and fan out in water. Sago pondweed is a bushy plant and should not be confused with those pondweeds which have long strandlike leaves that float in water.

Widespread over the United States, sago pondweed is one member of the pondweed family which cannot be killed by applications of sodium arsenite (Hiltibran 1961). Therefore, a recognition of this pest is necessary so that adequate control measures can be applied. Other pondweeds with tuberous roots may be difficult to kill with contact herbicides.

The leaves of other Potamogetons vary in form from broad floating leaves to very narrow and submersed leaves and in some species foliage will vary on the same plant. All pondweeds have a flower spike which extends above the water from the mainstem. Their description and identification are very difficult.

Only a few of the more distinctive *Potamogetons* will be described here. If others are encountered, a textbook key should be used to confirm membership at least to the genus *Potamogeton*. A county agent or agricultural experiment station can also be helpful when doubtful species need identification.

**Curlyleaf is Crispy**

Curlyleaf pondweed, *Potamogeton crispus*, as its name indicates, has curled, wavy leaves, a crispy texture, and fine "teeth" along leaf edges. Curlyleaf pondweed is common in temperate United States and extends its range south to Tennessee and Alabama and west to California. It will thrive in hard, muddy, or brackish water.

Another group of submersed pondweeds is the fine-leaved species. These have grasslike leaves which are variable as to the shape of the tip and the type of venation. Leaf edges of fine-leaved pondweeds are entire (smooth) as opposed to the naiad, *Najas* spp., which also has fine leaves, but is finely toothed along both edges.

**Naiads: Bushy Pondweeds**

Naiads, *Najas* spp., are of the family Najadaceae, although some authors include them in the same family with *Potamogetons* (Fassett, 1960). Naiads are collectively called bushy pondweeds; they do not exhibit as much variation within the genus as do *Potamogetons*.

In general, naiads are more uniform plants. Leaves are opposite and somewhat regularly spaced; all leaves are pointed and widen near the base. All species are submersed and there is no leaf variation on individual plants as there is in the *Potamogeton* pondweeds. Naiads flower from axils of leaves.

Two species which are most widespread and troublesome are southern naiad, *Najas guadalupensis*, and slender naiad, *N. flexilis*.

Southern naiad ranges along the Atlantic and Gulf coasts extending northward through the Mississippi basin onto the Plains and North Central States. It is also common in shallow waters in California. Southern naiad has fine teeth on both edges of leaves. All naiads have a widened base but some taper gradually; some have lobes. Southern naiad tapers gradually to the stem. Its dull seeds are pitted across the middle with...
If you can’t find the herbicide you’re looking for in the new Residex Catalogue—try this.

The new Residex catalogue provides technical information, prices and product listings for our complete line of 19 herbicides, especially formulated for industrial weed-control operations.

Since 1954, Residex has pioneered in distributing superior weed and turf products for custom applicators.

Why not use our experience to help you get started in this new and profitable field. Let us first help analyze your weed problems. Then, let us supply the specific herbicide, or mixture of herbicides, to solve the problem quickly and economically. Start cashing in on the weed and turf market now. Call or write today.

RESIDEX CORPORATION
225 Terminal Avenue, Clark, New Jersey
10 to 20 rows of coarse pits. (Hiltibran 1961).

Slender naiad, *Najas flexilis*, also has "toothed" leaves tapering at the base, but seeds are shiny with very fine pits. Slender naiad is a temperate species; it thrives mainly in northern states, ranging westward to the cooler Rocky Mountain and Northwestern States. It is not found in the Plains States.

Any of the several naiad species may be confused with *Elodea* if the naiads appear in closely tufted, shortleaf form. Differentiation is determined by the pointed tips and wider leaf bases of *Najas*, which also has "toothed" leaf edges and flowers in leaf axils.

Final group of submersed weeds to be considered is algae. Algae are free-floating, one-celled, colonial or filamentous, nonflowering plant organisms. Rough greenish coloration is imparted to water when algae are present in excess. Sometimes a typical fishy odor will lead one to determine that algae are responsible for the lessened desirability of a lake or pond for recreation.

Increased growth of algae frequently occurs as the result of fertilizer applied to water to increase fish-growing capacity. Generally, the application of fertilizer to ponds already containing higher aquatic weeds is not a good practice. Frequently with the decomposing of higher weeds following herbicide application, algae, because of lessened competition for nutrients, cause water to become sickly green and rather unattractive.

Exact identification of planktonic and filamentous algae is not always necessary because these can generally be controlled with properly applied amounts of copper, such as copper sulfate, also called blue vitriol or bluestone.

One filamentous species which is more difficult to control, and may require more than an inorganic mineral treatment, is *Pithophora* sp. This alga is typical of filamentous types; it grows attached to rocks and other plants. Cells form long, branched, "strings" which resemble hair when wafted by currents. As with some other species already mentioned, *Pithophora* breaks attachments late in the season and masses on the water surface. At this time it is said to look like a mat of wet wool. *Chara* sp. is a lower aquatic plant which bears a resemblance to some flowering weeds, but *chara* does not flower because it is an alga.

Recognized by typical primitive whorled branchlets, and its distinctive musky repulsive odor, *chara* or stonewort often marks the deepest point of water beyond which no other plants will grow. Beyond the chara line is the water zone which does not receive sufficient light to support rooted plant life (Odum 1959).

*Chara* is dark green, and very brittle. Since it inhabits calcareous water, it is often encrusted with lime deposits. Heavy stands of *chara* are said to have a softening effect on the naturally hard water. Presence of *chara* removes much of the calcium minerals from the water; minerals are apparently "attracted" to *chara* and held to the plant in an insoluble state. So although water may be suspected to be hard, it should be tested so that controls will be accurate. ("Hard" water is water with large amounts of dissolved calcium and magnesium salts, and high carbonate and bicarbonate alkalinity. Carbonates (CO₃) combine with copper and settle out, reducing the amount of copper for plant control.)

A close look with a hand lens should reveal the stem surface of *chara* to be ribbed or lined vertically. *Chara* is highly resistant to most chemicals, and may survive after death of other weeds. Accurate identification can predict this and accusations of job failure will be avoided.

Last group to be considered is surface or floating aquatic weeds. These may or may not be rooted; if rooted, leaves float or extend above the surface; if not rooted, leaves and flowers may stand erect from the floating mat.

One exception will be noted. Some waterlily species will be included in this group although they are rooted and some leaves stand erect, out of the water. Reason for inclusion is so that comparison of different leaf types necessary for identification will be easier.

The duckweed family boasts among its membership the smallest flowering plant and some other very tiny aquatic weeds.

*Lemna minor*, *Lemna* or common duckweed, is a very small light-green plant which floats on water and reproduces by lateral branching and splitting of the small leaves. Each plant (leaf) has one tiny root which hangs down into the water. Growth and

WEEDS AND TURF Pest Control, October, 1963
splitting are very fast and *Lemna* is able to cover a small pond in a short time if left unchecked. Small common duckweed plants are about the diameter of a lead pencil and will be seen near the shore protected from open water by larger plants. If common duckweed covers a pond, wind may cause the tiny plants to be blown to the windward side of the pond where they "climb the banks."

Other members of the duckweed family are *Spirodela* sp., giant duckweed, which has several rootlets hanging from the floating leaf. *Spirodela* is only slightly larger than *Lemna* and is usually red or purple on leaf undersides. *Wolflia* sp., watermeal, is nearly microscopic, has no roots, no leaves, and each plant looks like a green grain of sand or collectively as a green scum floating on the surface. It is the smallest flowering plant known.

**Waterhyacinth: Expense Weed**

Waterhyacinth is probably the most undesired aquatic weed in Florida, the Gulf States, and California. Since its introduction as an ornamental and subsequent escape in the late 1800’s into the inland waterways of Louisiana and Florida, cost of control has reached millions of dollars.

Waterhyacinth, *Eichhornia crassipes*, is a free-floating flowering plant which spreads mainly by vegetative reproduction, budding new offshoots from a parent plant in rapid order. Growth is in a rosette pattern; leaves are somewhat oval and are supported by a long petiole which is inflated and buoy up the plant. Fibrous roots extend into the water and absorb nutrients. New offshoots are bound to the parent plant by strong stolons. Flowers are very showy and attractive, colored white, blue, or violet; there are 6 petals fused into a tube at the base. Many flowers are borne on a single spike.

Waterhyacinth propagates so rapidly that mechanical control is often too slow to keep up with reinfestation. Excessively heavy growths clog canals so that navigation is precluded.

Waterlettuce, *Brasenia schreberi*, is similar to waterhyacinth in that it is a floating plant, but it does not clog waterways as much because interplant underwater connections are weak and easily broken. Waterlettuce has a range similar to waterhyacinth except that it does not occur in California, but does occur in Arizona.

Fleshy, prominently veined leaves have a covering of short, fine hair which makes liquid chemical control difficult without a wetting agent (Weldon 1962).

Waterlettuce may sometimes be found stranded on mud flats at which time it will take root weakly in mud. This plant has a flower, but it is a very inconspicuous one and not necessary for identification.

**Waterlilies**

Waterlilies, family Nymphaeaceae, are easily recognized by the large floating leaves, or pads, and showy white or yellow flowers. There are 4 genera of importance in this family.

**Leaf Structure Spots Waterlilies**

Watershield, *Nuphar lutea* (pentapelta), is also the only native species in this genus and is easily identified by the circular floating leaf which is connected to slender, horizontal roots by a stout petiole which joins the circular leaf in the middle. Leaves are somewhat depressed or saucer shaped, and very waxey to the touch. There is no split in leaves.

In the center of the lotus flower, made up of numerous pale-yellow petals, is the conical, fleshy receptacle in which seeds are formed. No other member of the waterlily family has such a conical receptacle; all others are globular.

Of the remaining two genera, spatterdock, *Nuphar advena*, and white waterlily, *Nymphaeas* spp., identification may be determined by venation of the floating or erect leaves.

Both genera have variable leaves; that is, they vary from nearly circular to somewhat arrowhead shaped. Leaves of both genera have a split at the point where the petiole joins the leaf. Despite these similarities, overall venation of the leaves is different. *Nuphar* or spatterdock has a

(Continued on page W-36)
Weeds and Turf presents below its annual Guide to Suppliers of vegetation control chemicals for use by contract applicators in urban industrial areas. There is a mixture of common and trade-marked names (indicated by an asterisk*). This has been unavoidable since usage and recommendations of researchers refer to a particular chemical by one or the other, depending upon the newness of the compound, whether its common name is easier to use, or industry acceptance. There will also be some differences of opinion over the inclusion or omission of certain chemicals under particular use categories. Here again confusion exists among reference sources. We have made our choices on the basis of most frequent mention in our surveys which preceded this compilation. Readers' comments and suggestions are invited to help us improve future editions. Keep this year's Guide handy for frequent use.

Advertisers in Weeds and Turf are listed in boldface type.

### Herbicides

**Soil Sterilants**

**AMITROLE**
- Amchem Products, Inc.
  - American Cyanamid Co.
  - E-Z Flo Chemical Co.
  - Hub States Chemical & Equipment Co.
  - Nalco Chemical Co.
  - Residex Corp.
  - Riverdale Chemical Co.
  - Southern Mill Creek Products Co.

**AMIZINE**
- Amchem Products, Inc.

**AMMONIUM SULFAMATE**
- Chapman Chemical Co.
- Chipman Chemical Co., Inc.
- E. I. duPont de Nemours & Co.
- Miller Chemical & Fertilizer Co.
- Nalco Chemical Co.
- Residex Corp.
- Southern Mill Creek Products Co.

**ATRAZINE**
- California Chemical Co., Ortho Div.
- Campbell Manufacturing Co.
- Chapman Chemical Co.
- E-Z Flo Chemical Co.
- Geigy Agricultural Chemicals
  - Hub States Chemical & Equipment Co.
  - Neil A. Maclean Co., Inc.
  - Miller Chemical & Fertilizer Corp.
  - Nalco Chemical Co.
- Residex Corp.
- Southern Mill Creek Products Co.
- Thompson-Hayward Chemical Co.

**BENZABOR**
- U. S. Borax & Chemical Corp.

**Borate Compounds**
- Chipman Chemical Co., Inc.
- Diamond Alkali Co.
- E-Z Flo Chemical Co.
- Industrial Materials Co.
- Neil A. Maclean Co., Inc.
- Nalco Chemical Co.

**Calcium Chloride**
- Dow Chemical Co.
- E-Z Flo Chemical Co.
- General Chemical Div., ACC
- Hub States Chemical & Equipment Co.
- Neil A. Maclean Co., Inc.
- Miller Chemical & Fertilizer Corp.
- Pittsburgh Plate Glass, Chem. Div.
- Southern Mill Creek Products Co.
- Thompson-Hayward Chemical Co.

**CARBYNE**
- Spencey Chemical Co.

**CHLORINIA**
- Chipman Chemical Co., Inc.
- E-Z Flo Chemical Co.

**DALAPON**
- Chapman Chemical Co.
- E-Z Flo Chemical Co.
- Hopkins Agricultural Chemical Co.
- Hub States Chemical & Equipment Co.
- Neil A. Maclean Co., Inc.
- Miller Chemical & Fertilizer Corp.
- Nalco Chemical Co.
- Residex Corp.
- Southern Mill Creek Products Co.
- Thompson-Hayward Chemical Co.

**DIURON**
- California Chemical Co., Ortho Div.
- Chapman Chemical Co.
- Chipman Chemical Co., Inc.
- E. I. duPont de Nemours & Co.
- E-Z Flo Chemical Co.
- Miller Chemical & Fertilizer Corp.
- Nalco Chemical Co.
- Residex Corp.
- Southern Mill Creek Products Co.

**ERBON**
- Chapman Chemical Co.
- E-Z Flo Chemical Co.
- Nalco Chemical Co.

### Advertisers

<table>
<thead>
<tr>
<th>Advertisers</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>National Chemsearch Corp.</td>
<td>Smith Douglass Co., Inc.</td>
</tr>
<tr>
<td></td>
<td>Stephenson Chemical Co., Inc.</td>
</tr>
<tr>
<td></td>
<td>U. S. Borax &amp; Chemical Corp.</td>
</tr>
<tr>
<td></td>
<td>Utility Chemical Co.</td>
</tr>
<tr>
<td><strong>FENAC</strong></td>
<td>Amchem Products, Inc.</td>
</tr>
<tr>
<td></td>
<td>Nalco Chemical Co.</td>
</tr>
<tr>
<td><strong>FENATROL</strong></td>
<td>Amchem Products, Inc.</td>
</tr>
<tr>
<td><strong>HCA</strong></td>
<td>E-Z Flo Chemical Co.</td>
</tr>
<tr>
<td></td>
<td>General Chemical Div., ACC</td>
</tr>
<tr>
<td></td>
<td>Southern Mill Creek Products Co.</td>
</tr>
<tr>
<td><strong>MONOBOR-CHLORATE</strong></td>
<td>E-Z Flo Chemical Co.</td>
</tr>
<tr>
<td></td>
<td>General Chemical Div., ACC</td>
</tr>
<tr>
<td></td>
<td>Southern Mill Creek Products Co.</td>
</tr>
<tr>
<td></td>
<td>U. S. Borax &amp; Chemical Corp.</td>
</tr>
<tr>
<td><strong>MONURON</strong></td>
<td>Chapman Chemical Co.</td>
</tr>
<tr>
<td></td>
<td>Chipman Chemical Co., Inc.</td>
</tr>
<tr>
<td></td>
<td>E. I. duPont de Nemours &amp; Co.</td>
</tr>
<tr>
<td></td>
<td>E-Z Flo Chemical Co.</td>
</tr>
<tr>
<td></td>
<td>Miller Chemical &amp; Fertilizer Corp.</td>
</tr>
<tr>
<td></td>
<td>Nalco Chemical Co.</td>
</tr>
<tr>
<td></td>
<td>Residex Corp.</td>
</tr>
<tr>
<td></td>
<td>Southern Mill Creek Products Co.</td>
</tr>
<tr>
<td><strong>NOVEGE</strong></td>
<td>Dow Chemical Co.</td>
</tr>
<tr>
<td><strong>PBA</strong></td>
<td>Amchem Products, Inc.</td>
</tr>
<tr>
<td></td>
<td>E. I. duPont de Nemours &amp; Co.</td>
</tr>
<tr>
<td></td>
<td>E-Z Flo Chemical Co.</td>
</tr>
<tr>
<td><strong>PROMETONE</strong></td>
<td>Geigy Agricultural Chemicals</td>
</tr>
<tr>
<td></td>
<td>Hub States Chemical &amp; Equipment Co.</td>
</tr>
<tr>
<td></td>
<td>Neil A. Maclean Co., Inc.</td>
</tr>
<tr>
<td></td>
<td>Pest Control Equipment Co.</td>
</tr>
<tr>
<td></td>
<td>Pest Control Equipment Co., Inc.</td>
</tr>
<tr>
<td></td>
<td>Riverdale Chemical Co.</td>
</tr>
<tr>
<td></td>
<td>Southern Mill Creek Products Co.</td>
</tr>
<tr>
<td></td>
<td>Thompson Chemical Co., Inc.</td>
</tr>
<tr>
<td><strong>SIMAZINE</strong></td>
<td>California Chemical Co., Ortho Div.</td>
</tr>
<tr>
<td></td>
<td>Campbell Manufacturing Co.</td>
</tr>
<tr>
<td></td>
<td>Chapman Chemical Co.</td>
</tr>
<tr>
<td></td>
<td>E-Z Flo Chemical Co.</td>
</tr>
<tr>
<td></td>
<td>Geigy Agricultural Chemicals</td>
</tr>
<tr>
<td></td>
<td>Hub States Chemical &amp; Equipment Co.</td>
</tr>
<tr>
<td></td>
<td>Lobel Chemical Corp.</td>
</tr>
<tr>
<td></td>
<td>Neil A. Maclean Co., Inc.</td>
</tr>
<tr>
<td></td>
<td>Miller Chemical &amp; Fertilizer Corp.</td>
</tr>
<tr>
<td></td>
<td>Nalco Chemical Co.</td>
</tr>
<tr>
<td></td>
<td>Niagara Chemical Div., FMC</td>
</tr>
<tr>
<td></td>
<td>Pest Control Equipment Co.</td>
</tr>
<tr>
<td></td>
<td>Pest Control Equipment Co., Inc.</td>
</tr>
</tbody>
</table>

**ADVERTISERS IN THIS MONTH'S WEEDS & TURF ARE LISTED IN BOLDFACE**
There's an "ANSAR" weed control product to meet your needs!

Look for the "Ansar" name and trademark on herbicides and weed control products. They're proven in use...backed by the world's largest manufacturer of organic arsenicals. Write...tell us your requirements! Part of our service is personal, problem-solving consultation.

"ANSAR" 184 D.S.M.A for selective control of crabgrass and Dallisgrass in turf.

"ANSAR" 170 MONOSODIUM METHYLARSONATE a concentrated solution with properties similar to D.S.M.A.

"ANSAR" 138 CACODYLIC ACID a highly effective non-selective herbicide that produces no residual effect.

"ANSAR" 290 METHYLARSONATE + 2, 4 D a combination herbicide effective on both broadleaf and grassy weeds.
Residex Corp.
Riverdale Chemical Co.
Southern Mill Creek Products Co.
Stephenson Chemical Co., Inc.
Thompson-Hayward Chemical Co.
York Chemical Co., Inc.

**SODIUM ARSENITE**
Black Leaf Products Co.
California Chemical Co., Ortho Div.
Chapman Chemical Co.
Chipman Chemical Co., Inc.
E-Z Flo Chemical Co.
General Chemical Div., ACC
Hopkins Agricultural Chemical Co.
Hub States Chemical & Equipment Co.
Industrial Materials Co.
Lobel Chemical Corp.
Miller Chemical & Fertilizer Co.
Miller Products Co.
National Chemsearch Corp.
Niagara Chemical Div., FMC
Pennsalt Chemicals Corp.
B. G. Pratt Co.
Residex Corp.
Southern Mill Creek Products Co.
Stephenson Chemical Co., Inc.
Thompson-Hayward Chemical Co.
Vineland Chemical Sales Corp.

**SODIUM CHLORATE**
Chipman Chemical Co., Inc.
Hooker Chemical Corp.
Nalco Chemical Co.
Pennsalt Chemicals Corp.
Pittsburgh Plate Glass, Chem. Div.

**TBA**
Chapman Chemical Co.

**TCA**
Chapman Chemical Co.
Dow Chemical Co.
E-Z Flo Chemical Co.
General Chemical Div., ACC
Nalco Chemical Co.
Residex Corp.
Robeco Chemicals, Inc.
Southern Mill Creek Products Co.

**TRITAC**
Hooker Chemical Corp.
Thompson-Hayward Chemical Co.
U. S. Borax & Chemical Corp.

**URAB**
General Chemical Div., ACC

**UREABOR**
U. S. Borax & Chemical Corp.

**UROX**
General Chemical Div., ACC

**VACATE**
Diamond Alkali Co.
Riverdale Chemical Co.
Southern Mill Creek Products Co.
Stephenson Chemical Co., Inc.

**BANDANE**
B. G. Pratt Co.
Prentiss Drug & Chemical Co., Inc.
Residex Corp.
Southern Mill Creek Products Co.
Thompson-Hayward Chemical Co.

**BANVEL—D**
Vineland Chemical Corp.

**BETASAN**
Stauffer Chemical Co.

**CALCIUM PROPYL ARSONATE**
Amchem Products, Inc.
W. A. Cleary Corp.
Smith Douglass Co., Inc.
Southern Mill Creek Products Co.

**CALCIUM ACID METHYL ARSONATE**
Amchem Products, Inc.
W. A. Cleary Corp.
Smith Douglass Co., Inc.
Southern Mill Creek Products Co.

**CHLORDANE**
See Insecticides

**CIPC**
Chapman Chemical Co.

**DACTHAL**
Chapman Chemical Co.
Diamond Alkali Co.
E-Z Flo Chemical Co.
Heritage House Products, Inc.
Lobel Chemical Corp.
Miller Chemical & Fertilizer Corp.
Pittsburgh Plate Glass, Chem. Div.

**DAMIBEN**
E-Z Flo Chemical Co.

**DIURO**
See Soil Sterilants

**EPTAM**
Chapman Chemical Co.
Stauffer Chemical Co.

**HERBAN**
Heracles Powder Co.

**PCCR**
Chapman Chemical Co.
Dow Chemical Co.
E-Z Flo Chemical Co.
Miller Chemical & Fertilizer Corp.
Pennsalt Chemicals Corp.

**SESONE**
Amchem Products, Inc.
E-Z Flo Chemical Co.
Miller Chemical & Fertilizer Corp.
Union Carbide Corp., Chemicals Div.

**SIMAZINE**
See Soil Sterilants

**SIMCALC**
Chapman Chemical Co., Inc.
E-Z Flo Chemical Co.
General Chemical Div., ACC
Lobel Chemical Corp.
Pennsalt Chemicals Corp.

**V EGADIR**
E-Z Flo Chemical Co.
Monsanto Chemical Co.
Smith Douglass Co., Inc.

**ZETRON**
Dow Chemical Co.
E-Z Flo Chemical Co.
Stephenson Chemical & Equipment Co.
Southern Mill Creek Products Co.

**AMINTROLE**
See Soil Sterilants

**AMMONIUM METHYL ARSONATE**
Amchem Products, Inc.
Southern Mill Creek Products Co.

**AMMONIUM SULFATE**
See Soil Sterilants

**ARSENIC ACID**
Ansul Chemical Co.
Black Leaf Products Co.

**CACODYLIC ACID**
Ansul Chemical Co.

**DACAMINE**
Diamond Alkali Co.
E-Z Flo Chemical Co.

**DALAPON**
See Soil Sterilants

**DIURON**
See Soil Sterilants

**DMA**
See Soil Sterilants

**EPTAM**
Chapman Chemical Co.
Stauffer Chemical Co.

**HERBAN**
Heracles Powder Co.

**PCCR**
Chapman Chemical Co.
Dow Chemical Co.
E-Z Flo Chemical Co.
Miller Chemical & Fertilizer Corp.
Pennsalt Chemicals Corp.

**SESONE**
Amchem Products, Inc.
E-Z Flo Chemical Co.
Miller Chemical & Fertilizer Corp.
Union Carbide Corp., Chemicals Div.

**SIMAZINE**
See Soil Sterilants

**SIMCALC**
Chapman Chemical Co., Inc.
E-Z Flo Chemical Co.
General Chemical Div., ACC
Lobel Chemical Corp.
Pennsalt Chemicals Corp.

**V EGADIR**
E-Z Flo Chemical Co.
Monsanto Chemical Co.
Smith Douglass Co., Inc.

**ZETRON**
Dow Chemical Co.
E-Z Flo Chemical Co.
Stephenson Chemical & Equipment Co.
Southern Mill Creek Products Co.

**AMINTROLE**
See Soil Sterilants

**AMMONIUM SULFATE**
See Soil Sterilants

**ARSENIC ACID**
Ansul Chemical Co.

**CACODYLIC ACID**
Ansul Chemical Co.

**DACAMINE**
Diamond Alkali Co.
E-Z Flo Chemical Co.

**DALAPON**
See Soil Sterilants

**DIURON**
See Soil Sterilants

**DMA**
See Soil Sterilants

**ATRAZINE**
See Soil Sterilants

**BORATE COMPOUNDS**
See Soil Sterilants

**CACODYLIC ACID**
Ansul Chemical Co.

**DACAMINE**
Diamond Alkali Co.
E-Z Flo Chemical Co.

**DALAPON**
See Soil Sterilants

**DIURON**
See Soil Sterilants

**DMA**
See Soil Sterilants
Control Insects
this better, safer way!

USE SEVIN
INSECTICIDE

Effective and long-lasting SEVIN provides powerful control of major insect pests of trees and shrubs. SEVIN is safer to handle and safer to birds and wildlife than most other insecticides.

You knock out chinch bug, sod webworm and many other turf pests easily with SEVIN. It is deadly to insects, and its lower toxicity to humans, pets, birds and fish makes SEVIN ideal to use in any turf area.

SEVIN controls Japanese beetle, rose slug, codling moth, leafhopper and other insects on garden trees, flowers and vegetables—with few applications. Versatile SEVIN controls more than 150 different insects.

Gypsy moth, cankerworm, forest tent caterpillar and other major pests of forest and woodland trees are readily controlled with SEVIN insecticide. Drift is no problem, even to nearby pastures, fields or streams.

SEVIN insecticide gives you a wide margin of safety in insect control programs that provide effective, long-lasting, economical results. Powerful against insects, but safer to handle and use than most other insecticides, SEVIN is ideal for use by your spray crews in urban and suburban areas as well as in country recreation developments. For detailed information, contact: Union Carbide Chemicals, 270 Park Ave., New York, N. Y. 10017.

SEVIN is the registered trade mark of Union Carbide Corporation for carbaryl insecticide.
Miller Chemical & Fertilizer Corp.
Southern Mill Creek Products Co.
Stauffer Chemical Co.
Stephenson Chemical Co., Inc.
Vineland Chemical Sales Corp.

**ENDOTHALL**
Chipman Chemical Co., Inc.
E-Z Flo Chemical Co.
Pennsalt Chemicals Corp.
Southern Mill Creek Products Co.

**FENAC**
See Soil Sterilants

**FENURON**
Chapman Chemical Co.
E. I. duPont de Nemours & Co.
E-Z Flo Chemical Co.
Nalco Chemical Co.
Southern Mill Creek Products Co.

**MCPA**
Chapman Chemical Co., Inc.
Diamond Alkali Co.
Dow Chemical Co.
E-Z Flo Chemical Co.
Lobel Chemical Co.
Nalco Chemical Co.
Riverdale Chemical Co.

**MONURON**
See Soil Sterilants

**NEBURON**
E-Z Flo Chemical Co.
Residex Corp.

**PHENYLmercuric acetate**
W. A. Cleary Corp.
Lobel Chemical Corp.
Malinckrodt Chemical Works
Vineland Chemical Sales Corp.

**PROMETONE**
See Soil Sterilants

**PROPZINDA**
Chapman Chemical Co.
E-Z Flo Chemical Co.
Geigy Agricultural Chemicals
Neal A. Maclean Co., Inc.
Nalco Chemical Co.
Residex Corp.
Riverdale Chemical Co.
Southern Mill Creek Products Co.

**SILVEK**
Amchem Products, Inc.
Black Leaf Products Co.
Chapman Chemical Co.
Chipman Chemical Co., Inc.
Diamond Alkali Co.
Dow Chemical Co.
E-Z Flo Chemical Co.
Hercules Powder Co.
Neal A. Maclean Co., Inc.
Miller Chemical & Fertilizer Corp.
Nalco Chemical Co.
Pennsalt Chemicals Corp.
Residex Corp.
Riverdale Chemical Co.
Smith Douglass Co., Inc.
Southern Mill Creek Products Co.
Thompson Chemicals Corp.

**TORDON**
Amchem Products, Inc.
Dow Chemical Co.

**TRITAC-D**
Hooker Chemical Corp.

**TRYSBEN**
California Chemical Co., Ortho Div.
Campbell Manufacturing Co.
Chipman Chemical Co.
E. I. duPont de Nemours & Co.
E-Z Flo Chemical Co.
Nalco Chemical Co.
Southern Mill Creek Products Co.

**2,4-D**
Amchem Products, Inc.
Black Leaf Products Co.
California Chemical Co., Ortho Div.
Campbell Manufacturing Co.
Chipman Chemical Co.
Chenagro Corp.
Chipman Chemical Co., Inc.
W. A. Cleary Corp.
Diamond Alkali Co.
Dow Chemical Co.
E-Z Flo Chemical Co.
General Chemical Div., ACC
Hercules Powder Co.
Heritage House Products, Inc.
Hub States Chemical & Equipment Co.
Lobel Chemical Corp.
Neil A. Maclean Co., Inc.
Miller Chemical & Fertilizer Corp.
Miller Products Co.
Nalco Chemical Co.
Niagara Chemical Div., PMC
B. G. Pratt Co.

**REDICROP**
Residex Corp.
Riverdale Chemical Co.
Smith Douglass Co., Inc.
Southern Mill Creek Products Co.
Stauffer Chemical Co.

**2,4,5-T**
Amchem Products, Inc.
Black Leaf Products Co.
California Chemical Co., Ortho Div.
Campbell Manufacturing Co.
Chipman Chemical Co.
W. A. Cleary Corp.
Diamond Alkali Co.
Dow Chemical Co.
E-Z Flo Chemical Co.
General Chemical Div., ACC
Hercules Powder Co.
Hub States Chemical & Equipment Co.
Lobel Chemical Corp.
Neil A. Maclean Co., Inc.
Miller Chemical & Fertilizer Corp.
Miller Products Co.
Nalco Chemical Co.
Niagara Chemical Div., PMC
B. G. Pratt Co.
Residex Corp.
Riverdale Chemical Co.
Smith Douglass Co., Inc.
Southern Mill Creek Products Co.
Stauffer Chemical Co.

**ZOBAR**
E-Z Flo Chemical Co.

---

**AQUATIC HERBICIDES**

**ACROLEIN**
Shell Chemical Co.
Southern Mill Creek Products Co.

**AMITROLE**
See Soil Sterilants

**AMITROL-T**
Amchem Products, Inc.
E-Z Flo Chemical Co.
Hub States Chemical & Equipment Co.
Miller Chemical & Fertilizer Corp.
Residex Corp.
Riverdale Chemical Co.
Southern Mill Creek Products Co.

**AMMONIUM SULFAMATE**
See Soil Sterilants

**AQUALIN**
Shell Chemical Co.
Southern Mill Creek Products Co.

**AQUATHOL**
E-Z Flo Chemical Co.
Chipman Chemical Co., Inc.
Pennsalt Chemicals Corp.
Southern Mill Creek Products Co.
Thompson-Hayward Chemical Co.

**AQUATHOL PLUS**
Chipman Chemical Co., Inc.
E-Z Flo Chemical Co.
Pennsalt Chemicals Corp.
Thompson-Hayward Chemical Co.

**CIP**
See Pre-Emergent Herbicides

**DACAMINE**
See Pre-Emergent Herbicides

**DALAPON**
See Soil Sterilants

**DIQUAT**
California Chemical Co., Ortho Div.
Chipman Chemical Co., Inc.
Residex Corp.

**DIURON**
See Soil Sterilants

**ERBON**
See Soil Sterilants

**FENAC**
See Soil Sterilants

**HCA**
See Soil Sterilants

**HYDROTHOL**
Pennsalt Chemicals Corp.

**KUROSAL**
Dow Chemical Co.
Residex Corp.

**MCPC**
See Post-Emergent Herbicides

**ORTHODICHLOBENZENE**
Miller Chemical & Fertilizer Corp.
Pittsburgh Plate Glass, Chem. Div.
Residex Corp.
Robeco Chemicals, Inc.
Southern Mill Creek Products Co.

---

**W-22**
WEEDS AND TURF Pest Control, October, 1963
You can now kill brush on a year 'round basis

The key: Dormant Cane Broadcast — Scientists' concepts of chemical brush killing used to be that woody plants could not be effectively controlled with winter-month application. Diamond, however, sponsored research on this unique application method of brush control with the use of six-pound acid equivalent Line Rider formulations. The results speak for themselves:

- Materials needed reduced • Application time in hours per acre reduced • Kill effectiveness increased • Effective spray season lengthened • Hazard of crop damage eliminated • Unsightly brown-out eliminated.

Diamond's experience and specific formulation techniques with dormant cane broadcast can be of help to you. For details on dormant cane broadcast or six-pound Line Rider products, write Diamond Alkali Company, 300 Union Commerce Building, Cleveland, Ohio 44114.
**ALGICIDES**

**BORASCUS**
Stephenson Chemical Co., Inc.
U. S. Borax & Chemical Corp.

**COPPER METHYL ARSONATE**
Ansu Chemical Co.
E-Z Flo Chemical Co.

**CALCIUM HYPOCHLORITE**
Pennsalt Chemicals Corp.
Pittsburgh Plate Glass, Chem. Div.
Robeco Chemicals, Inc.
Smith Douglass Co., Inc.

**CETYL PICOLINIUM BROMIDE**
Michigan Chemical Corp.

**CHELATING AGENTS**

**IRON CHELATE**
Chapman Chemical Co.
Geigy Agricultural Chemicals
Hub States Chemical & Equipment Co.
Lobel Chemical Corp.
Neil A. Maclean Co., Inc.
National Chemsearch Corp.
Resideo Corp.
Riverdale Chemical Co.
Southern Mill Creek Products Co.
Stephenson Chemical Co., Inc.
York Chemical Co., Inc.

**SEQUESTRANE PRODUCTS**
Chapman Chemical Co.
E-Z Flo Chemical Co.
Geigy Agricultural Chemicals
Hub States Chemical & Equipment Co.
Neil A. Maclean Co., Inc.
Pest Control Equipment Co.
Prentiss Drug & Chemical Co., Inc.
Riverdale Chemical Co.
Southern Mill Creek Products Co.
Stephenson Chemical Co., Inc.
York Chemical Co., Inc.

**VERSENOL**
Dow Chemical Co.

**FUNGICIDES**

**ACTI-DIONE**
E-Z Flo Chemical Co.
Southern Mill Creek Products Co.
Upjohn Co.

**CADMINE**
E-Z Flo Chemical Co.
Mallinckrodt Chemical Works

**CADMINE COMPOUNDS**
W. A. Cleary Corp.
Mallinckrodt Chemical Works
Metalsalts Corp.
National Chemsearch Corp.
Southern Mill Creek Products Co.
Stephenson Chemical Co., Inc.
Vineland Chemical Sales Corp.

**CALO-CLOR**
Mallinckrodt Chemical Works

**CALOCURE**
Mallinckrodt Chemical Works

**CALOMEL**
Doggett Fison Co.
General Chemical Div., ACC
Mallinckrodt Chemical Works

**CAPTAN**
California Chemical Co., Ortho Div.
Chapman Chemical Co.
E-Z Flo Chemical Co.
Hub States Chemical & Equipment Co.
Lobel Chemical Corp.
Neil A. Maclean Co., Inc.
Miller Chemical & Fertilizer Corp.
Smith Douglass Co., Inc.

**CALSOL**
E. I. duPont de Nemours & Co.
Southern Mill Creek Products Co.

**CHELYDINE**
Ansul Chemical Co.

**DICHLOROPROPENE FUMIGANTS**
Smith Douglass Co., Inc.
Stephenson Chemical Co., Inc.

**DYRENE**
Cheminor Corp.
E-Z Flo Chemical Co.
Heritage House Products, Inc.
Neil A. Maclean Co., Inc.
Stephenson Chemical Co., Inc.

**EMMI**
Riverdale Chemical Co.
Southern Mill Creek Products Co.
Stephenson Chemical Co., Inc.
Velosol Chemical Corp.

**FERBAM**
Chapman Chemical Co., Inc.
E. I. duPont de Nemours & Co.

**FOLPET**
California Chemical Co., Ortho Div.
E-Z Flo Chemical Co.
Riverdale Chemical Co.
Stephenson Chemical Co.

**GLYODIN**
E-Z Flo Chemical Co.
Miller Chemical & Fertilizer Corp.
Niagara Chemical Div., FMC
Pittsburgh Plate Glass, Chem. Div.
Union Carbide Corp., Chemicals Div.

**KARATHANE**
Vineland Chemical Sales Corp.

**KROMAD**
Mallinckrodt Chemical Works
Southern Mill Creek Products Co.

**MANEB**
E. I. duPont de Nemours & Co.
Rohm & Haas Co.

**MERCURAM**
Vineland Chemical Sales Corp.

**METHYL BROMIDE**
California Chemical Co., Ortho Div.
Chapman Chemical Co.
Dow Chemical Co.
E-Z Flo Chemical Co.
Frontier Chemical Co.
Great Lakes Chemical Corp.
Hub States Chemical & Equipment Co.
Lobel Chemical Corp.
Neil A. Maclean Co., Inc.
Michigan Chemical Corp.
Miller Chemical & Fertilizer Co.
Niagara Chemical Div., FMC
Pest Control Equipment Co.
Resideo Corp.

**POTASSIUM IODIDE**
Mallinckrodt Chemical Works

**PHYGON XL**
E-Z Flo Chemical Co.
General Chemical Div., ACC
Lobel Chemical Corp.
Niagara Chemical Div., FMC
Southern Mill Creek Products Co.

**SODIUM ARSENITE**
See Soil Sterilants

**SODIUM CARBONATE**
See Aquatic Herbicides

**SODIUM CHROMATE**
See Miticides

**SODIUM CHLORIDE**
See Aquatic Herbicides

**SODIUM HYDROXIDE**
See Aquatic Herbicides

**SODIUM METASULFITE**
See Soil Sterilants

**Southern Mill Creek Products Co.**

**WEEDS AND TURF Pest Control, October, 1968**

W-24
VICH E M

FUNGICIDES & HERBICIDES

for treatment and maintenance of fine turf

PERLITE®
Great Lakes Carbon Corp.

VERMICULITE
Zonolite Div., W. R. Grace & Co.

GROWTH RETARDANTS

PHOSFON®
Lobel Chemical Corp.
Virginia-Carolina Chemical Corp.

MALEIC HYDRAZIDE
California Chemical Co., Ortho Div.
E-Z Flo Chemical Co.
Naugatuck Chemical
Southern Mill Creek Products Co.

These specialty products, developed specifically for golf course and park use, are now available for the treatment and control of fine turf grasses. VICH E M research in agricultural chemicals has produced such outstanding developments as DSMA—DiSodium Methyl Arsonate; AMA—Ammonium Methyl Arsonate; CPA—Calcium Propyl Arsonate; CALAR—Calcium Acid Methyl Arsonate.

... the finest chemicals to protect your finest turf.

VINELAND, NEW JERSEY

HERBICIDES

• for Crabgrass and weed control
  CRAB-E-RAD (Powder) DSMA
SUPER CRAB-E-RAD (Liquid) AMA
SUPER CRAB-E-RAD (Liquid) + 2,4,0
CRAB-E-RAD 30 (Liquid) DSMA

• for Dallis grass control
  DAL-E-RAD 100 (Powder) DSMA
SUPER DAL-E-RAD (Liquid) AMA
SUPER DAL-E-RAD + 2 (Liquid) AMA + 2,4,0
DAL-E-RAD 30 (Liquid) DSMA

When Writing to Advertisers Please Mention WEEDS AND TURF

W-25
**INSECTICIDES**

**ALDRIN**
- California Chemical Co., Ortho Div.
- Campbell Manufacturing Co.
- Chapman Chemical Co.
- Chipman Chemical Co., Inc.
- General Chemical Div., ACC
- Hub States Chemical & Equipment Co.
- Lobel Chemical Corp.
- Neil A. Maclean Co., Inc.
- Miller Products Co.
- Niagara Chemical Div., FMC
- Pennsalt Chemicals Corp.
- Prentiss Drug & Chemical Co., Inc.
- Riverdale Chemical Co.
- Shell Chemical Co.

**BHC**
- California Chemical Co., Ortho Div.
- Chapman Chemical Co.
- Chipman Chemical Co., Inc.
- Diamond Alkali Co.
- E-Z Flo Chemical Co.
- General Chemical Div., ACC
- Hooker Chemical Corp.
- Hub States Chemical & Equipment Co.

**ASPON**
- Southern Mill Creek Products Co.
- Staufer Chemical Co.

**CHLORDANE**
- Black Leaf Products Co.
- California Chemical Co., Ortho Div.
- Chapman Chemical Co.
- Chipman Chemical Co., Inc.
- W. A. Cleary Corp.
- Doggett Fison Co.
- E-Z Flo Chemical Co.
- Heritage House Products, Inc.
- Hub States Chemical & Equipment Co.
- Lobel Chemical Corp.
- Neil A. Maclean Co., Inc.
- Miller Chemical & Fertilizer Corp.
- Miller Products Co.
- National Chemsearch Corp.
- Naugatuck Chemical
- Niagara Chemical Div., FMC
- S. B. Penick & Co.
- Pennsalt Chemicals Corp.
- Pest Control Equipment Co.
- R. G. Pratt Co.
- Prentiss Drug & Chemical Co., Inc.
- Residex Corp.
- Riverdale Chemical Co.
- Smith Douglass Co., Inc.
- Southern Mill Creek Products Co.
- Staufer Chemical Co.
- Thompson-Hayward Chemical Co.
- Thompson-Chemicals Corp.
- Thompson-Chemicals Corp.
- Woodbury Chemical Co.
- York Chemical Co., Inc.

**DDT**
- Black Leaf Products Co.
- California Chemical Co., Ortho Div.
- Campbell Manufacturing Co.
- Chapman Chemical Co.
- Chipman Chemical Co., Inc.
- Diamond Alkali Co.
- Doggett Fison Co.
- E-Z Flo Chemical Co.
- General Chemical Div., ACC
- Hub States Chemical & Equipment Co.
- Lobel Chemical Corp.
- Neil A. Maclean Co., Inc.
- Miller Chemical & Fertilizer Corp.
- Miller Products Co.
- National Chemsearch Corp.
- Naugatuck Chemical
- Niagara Chemical Div., FMC
- S. B. Penick & Co.
- Pennsalt Chemicals Corp.
- Pest Control Equipment Co.
- R. G. Pratt Co.
- Prentiss Drug & Chemical Co., Inc.
- Residex Corp.
- Riverdale Chemical Co.
- Smith Douglass Co., Inc.
- Southern Mill Creek Products Co.
- Staufer Chemical Co.
- Thompson-Chemicals Corp.
- Thompson-Chemical Co.
- Thompson-Hayward Chemical Co.
- Woodbury Chemical Co.

**DDVP**
- Chapman Chemical Co.
- Norda Essential Oil & Chemical Co.
- Shell Chemical Co.

**DELNAV**
- California Chemical Co., Ortho Div.
- Chapman Chemical Co.

**ATTENTION!**

**CUSTOM APPLICATORS AND TERMITE OPERATORS**

you can make more money with the **PCE TURF & TERMITE PUMP**
for ornamental tree spraying, soil injection, termite, grub and weed control, etc.

**BECAUSE users say it gives LONGER TROUBLE-FREE SERVICE!**

Write for our latest CATALOG!

**COMPARE THESE FEATURES:**
- Over-size bronze gear pump by Oberdorfer
- Carbon bearing pump head
- Easy pressure adjustment by hand wheel
- Special skid pan

**COMPLETE with:**
- Pressure gauge, gunjet valve, 5 hp. Briggs & Stratton engine, 100' 3/8" i.d. hose, pressure regulator, adapter, 4 nozzles, extensions.

**$258.50**

Freight allowed on all shipments East of Mississippi, Elsewhere in U.S. add $6.00

**PEST CONTROL EQUIPMENT CO.**
Chemicals and Equipment for the PCO
24 North Bond Street MO 8-1197 Mount Vernon, N.Y.
<table>
<thead>
<tr>
<th><strong>HERCULES POWDER CO.</strong></th>
<th><strong>NEIL A. MACLEAN CO., INC.</strong></th>
<th><strong>SOUTHERN MILL CREEK PRODUCTS CO.</strong></th>
<th><strong>YORK CHEMICAL CO., INC.</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DIAZINON</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-Z Flo Chemical Co.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Miller Products Co.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>National Chemicalsearch Corp.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Niagara Chemical Div., FMC</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pennsalt Chemicals Corp.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pest Control Equipment Co.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>B. G. Pratt Co.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Prentiss Drug &amp; Chemical Co., Inc.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Riverdale Chemical Co.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Shell Chemical Co.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Smith Douglass Co., Inc.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Southern Mill Creek Products Co.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Staufer Chemical Co.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Stephenson Chemical Co., Inc.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Thompson-Hayward Chemical Co.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Woodbury Chemical Co.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>York Chemical Co., Inc.</td>
</tr>
<tr>
<td><strong>DINITRO COMPOUNDS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-Z Flo Chemical Co.</td>
<td></td>
<td></td>
<td>Niagara Chemical Div., FMC</td>
</tr>
<tr>
<td>Hub States Chemical &amp; Equipment Co.</td>
<td></td>
<td>Smith Douglass Co., Inc.</td>
<td>Staufer Chemical Co.</td>
</tr>
<tr>
<td>E-Z Flo Chemical Co.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>DIELDRIN</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>California Chemical Co., Ortho Div.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black Leaf Products Co.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-Z Flo Chemical Co.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>DISYSTON</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-Z Flo Chemical Co.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>DORMANT OILS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>California Chemical Co., Ortho Div.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-Z Flo Chemical Co.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hub States Chemical &amp; Equipment Co.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E-Z Flo Chemical Co.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>PREVENT...CONTROL</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TURF FUNGAL DISEASES</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prevent ugly, unsightly spotting caused by turf fungal diseases. Maintain lawn health and beauty all season by spraying with Panogen Turf Fungicide. This hard-working lawn care chemical has been proven effective against all common turfgrass diseases. It can be used to prevent disease... or to control an outbreak during the early stages. Panogen Turf Fungicide is a liquid concentrate. You simply mix it with water and spray on the grass. It's safe, economical, easy-to-use. Ask your chemical supplier for Panogen Turf Fungicide soon.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
SODIUM TCA 95%
MANUFACTURED IN HOLLAND

COPPER SULPHATE
LINDANE
THIRAM

ROBECO Chemicals, Inc.
25 EAST 26th STREET NEW YORK 10, N.Y.
MURRAY HILL 3-7500

W-28 WEEDS AND TURF Pest Control, October, 1963
FOR SAFE SPRAYS USE PRATT’S

Arborists and Custom Sprayermen have depended upon PRATT’S for quality spray formulations for over half a century.

Start your schedule with SCALECIDE — the "dean" of the Oil Sprays. So safe that it can also be used as a foliar spray.

Pratt’s formulates a complete line of emulsifiable concentrates for hydraulic and mist blowers and oil base concentrates for thermal fog equipment.

Send for our free circular, "Pratt’s Spray Bulletin for Shade Tree Spraying."

B. G. PRATT COMPANY

203 21st Avenue • Paterson 3, N. J.
ADVERTISERS
IN THIS MONTH'S WEEDS & TURF
ARE LISTED IN BOLDFACE

Neil A. Maclean Co., Inc.
Miller Chemical & Fertilizer Corp.
Miller Products Co.
B. G. Pratt Co.
Residex Corp.
Rohm & Haas Co.
Southern Mill Creek Products Co.

METHYL TRITHION
See Insecticides

MITOX*
California Chemical Co., Ortho Div.
E-Z Flo Chemical Co.
Southern Mill Creek Products Co.

MOROCIDE*
Niagara Chemical Div., FMC

OVEX
California Chemical Co., Ortho Div.
Diamond Alkali Co.
E-Z Flo Chemical Co.
General Chemical Div., ACC
Lobel Chemical Corp.
Miller Chemical & Fertilizer Corp.
Stauffer Chemical Co.

PENTAC*
Hooker Chemical Corp.

SCHRADAN
Pennsalt Chemicals Corp.

SULPHENONE*
Stauffer Chemical Co.

TEDION*
California Chemical Co., Ortho Div.
E-Z Flo Chemical Co.
General Chemical Div., ACC
Miller Chemical & Fertilizer Corp.
Niagara Chemical Div., FMC
Southern Mill Creek Products Co.
Stauffer Chemical Co.

TOXAPHENE
See Insecticides

TRITHION*
See Insecticides

NEPATOMIDES

D-D
California Chemical Co., Ortho Div.
Shell Chemical Co.
Stauffer Chemical Co.

DICHLOROPROPENES
See Fungicides

MYLONE*
E-Z Flo Chemical Co.
Miller Chemical & Fertilizer Corp.
Niagara Chemical Div., PMC Corp.
Smith Douglass Co., Inc.
Southern Mill Creek Products Co.
Union Carbide Corp., Chemicals Div.

NEMAGON*
See Fungicides

PENPHENE*
Pennsalt Chemicals Corp.

VAPAM*
Chapman Chemical Co.
E-Z Flo Chemical Co.
Miller Chemical & Fertilizer Corp.
Residex Corp.
Southern Mill Creek Products Co.
Stauffer Chemical Co.
Stephenson Chemical Co., Inc.

VC-13* See Insecticides

VORLEX*
E-Z Flo Chemical Co.
Morton Chemical Co.

SOIL FUMIGANTS

BEDRENCH
Smith Douglass Co., Inc.

CHLOROPRIN
E-Z Flo Chemical Co.
Hub States Chemical & Equipment Co.
Neil A. Maclean Co., Inc.
Residex Corp.
Smith Douglass Co., Inc.
Southern Mill Creek Products Co.

D-D See Nematocides

DOWFUME*
Chapman Chemical Co.
Dow Chemical Co.

ETHYLENE DIBROMIDE
California Chemical Co., Ortho Div.
E-Z Flo Chemical Co.
Hub States Chemical & Equipment Co.
Neil A. Maclean Co., Inc.
Michigan Chemical Corp.
Niagara Chemical Div., FMC
Pest Control Equipment Co.
Residex Corp.
Smith Douglass Co., Inc.
Southern Mill Creek Products Co.

FUMAZONE*
Dow Chemical Co.

METHYL BROMIDE
See Fungicides

MYLONE* See Nematocides

TELONE*
Dow Chemical Co.

TRIZONE
Dow Chemical Co.

VAPAM* See Nematocides

VIDDEN D
Dow Chemical Co.

VORLEX* See Nematocides

Tell Advertisers
You Learned About Them
in WEEDS and TURF

Weeds and Turf Pest Control, October, 1963
HSAF '63 Convention Program Like
College Course in Its Diversity

Program plans for the Horticultural Spraymen's Association of Florida 1963 Convention promise delegates what nearly amounts to a distilled college course in turf maintenance.

Meeting for three lecture-and-panel-packed days Oct. 31-Nov. 2 at Orlando's Robert Meyer Motor Inn, HSAF members will hear noted authorities on such diverse subjects as lawn renovation, citrus spraying, growth retardants, and business management.

Also included on this year's program are the customary basic studies of importance to the membership. These include talks on chinch bugs, nematodes, diseases of ornamentals, common lawn insects, turf diseases, and weed control in established turf.

Field-oriented aspects of the program include an observation of lawn spraying, and an afternoon-long display of equipment, where suppliers will show off their latest machines.

Mr. Contract Applicator:

YOU SHOULD KNOW ABOUT EPOXY

... the exclusive, "Fire-Cured" protective coating that makes the tank and all cast iron parts on Myers Power Sprayers last longer — give more efficient, more dependable, more economical service.

Myers offers a complete line of Epoxy-protected power sprayers to meet all your contract spraying needs — from 12½ gallon wheelbarrow units to big 1,000 gallon sprayers. Available with a range of rugged, high efficiency pumps designed specifically for spray applications. Capacities to 100 GPM, pressures to 800 PSI.

For more information, call your local Myers Sprayer Dealer, or write today to:

... the finest name in power sprayers

The F. E. Myers & Bro. Co.
ASHLAND, OHIO KITCHENER, ONTARIO

A. Fire-Cured Epoxy Coating
B. Special Bonding Preparation
C. Quality cold-rolled Steel Tank

W-32 WEEDS AND TURF Pest Control, October, 1963
KEEP GRASS GREEN

WITH

V-C 13

KILLS NEMATODES
AND CHINCH BUGS

V-C 13 is the ideal liquid product to use to protect turf from nematodes and chinch bugs. Nematodes are tiny, thread-like worms that attack grass roots and stunt or ruin growth. Fertilizer, water and good care are wasted when nematodes wreck grass roots. Chinch bugs are death on green grass. They actually suck the life out of grass stems. The grass turns yellow and then brown, as it dies. V-C 13 is a practical, easy way to destroy nematodes and chinch bugs. It provides powerful, long-lasting control of these destructive pests. And V-C 13 is safer to use, lower in toxicity than chlorinated hydrocarbon preparations. It's easy to keep grass green with V-C 13. Get it from your supplier or write to the address below for full information.

VIRGINIA-CAROLINA
CHEMICAL CORPORATION
401 East Main Street
Richmond 8, Virginia
Lawn Clippings Removal Studied

In a 3-year study of lawn management of Kentucky and Merion bluegrass, George A. Beach, horticulturist with Colorado State University, Fort Collins, concluded that although plots where clippings were removed were rated highest on appearance, the difference between ratings on removal and nonremoval was not statistically significant in most cases.

In the experiment, 12 lawn plots were checked each year for 3 years. “In 36 comparisons, 29 showed no significant difference in appearance whether clippings were removed or not,” Beach revealed.

Plots were mowed often enough so that only 1/2 inch of blade was removed at each cutting to bring grass to the desired height, however, and if lawns are not cut this frequently, clippings would probably have to be removed for best appearance, Beach cautioned.

Removal or nonremoval of clippings also may depend on other management factors such as fertilization, Beach explained. “For example, if clippings are not removed and the grass is growing rapidly from fertilization, the abundance of dried clippings may damage the appearance somewhat.”

WSA, AWCS Set Joint Session

For applicators who are interested in attending both the Weed Society of America Conference and the Aquatic Weed Control Society meeting in Chicago, Ill., next February, a joint session has been arranged.

Since the WSA meet is slated for Feb. 10-13 at Chicago’s Pick-Congress Hotel, and the AWCS will convene Feb. 11-12 at the Palmer House, this joint session has been scheduled to avoid some of the conflict of interests among delegates who wish to attend both meetings.

Program chairman for the AW-CS is Dr. John Gallagher, Amchem Products, Inc., Ambler, Pa.; WSA secretary is Dr. G. C. Klingman, Crops Science Dept., N.C. State College, Raleigh, N.C. Those who want more details about either meeting should write directly to either Klingman or Gallagher.
Ever-increasing importance of technical know-how for those who are responsible for maintaining fine stands of turfgrass was evidenced this year by a record-breaking attendance at the 11th Annual Florida Turfgrass Management Conference August 27-29, at the University of Florida, Gainesville.

Sponsored by the Florida Turfgrass Association and the University of Florida's Agricultural Experiment Station and Department of Agriculture, the Conference attracted over 400 delegates from Florida and such widespread points as New York, California, Texas, and all the southern states.

Fields of interest represented this year included horticultural spraymen, lawn service and landscaping agencies, golf course, park and cemetery supervisors, and nurserymen.

During the general session, which featured turf insects, and throughout the professional discussion sections and tour of the turf research areas, every aspect of turf management and research was reviewed by speakers from across the country.

Praise Growth Retardants

Jack Cabler, assistant ornamental horticulturist with the Florida Agricultural Extension Service, reviewed one of the most significant research studies being conducted by the Experiment Stations. Cabler said the use of growth retardants appears very promising. After several more years of testing, these compounds may be available for the homeowner. "It has also been found that growth retardants help grasses grow in shade," Cabler indicated.

Other recent research reveals that lawns fertilized with organic nitrogen are less susceptible to chinch bug damage than those fertilized with chemical nitrogen.

Dr. G. C. Horn, associate turf technologist, and Dr. W. L. Pritchett, soils technologist, both of the Florida Experiment Stations, explain that they believe grass treated with organic nitrogen is less susceptible to chinch bugs because organic fertilizers act more slowly than chemical fertilizers.


A new feature of the Conference was the "Industry Hour," in which representatives of leading chemical and fertilizer firms presented the latest information available on the use of their products in the field of turf. With 300 in attendance for this evening session, the popularity of this program was apparent and plans are to continue it, each year featuring a new aspect of turf interest, such as major equipment, soil amendments, etc.

At the annual meeting following the industry hour, Dr. Gene C. Nutter, Executive Director of the Golf Course Superintendents Association of America, was elected FT-GA President for the coming year. Elected to serve with him were James L. Blackledge, vice-president, Barco Inc., Lake Worth; and L. N. Clark, secretary-treasurer, Director of Parks and Recreation, Jacksonville Beach. Also elected as directors with a three-year term of office were Howard C. Bardsley, P. E. C.
Know Your Species

WATERHYACINTH
(Eichhornia crassipes)

Waterhyacinth, a flowering, tropical aquatic weed, reproduces by vegetative offshoots from parent plants and by seed. This free-floating weed is found throughout the Gulf Coast region of southern United States where it spreads so rapidly that it clogs inland waterways and prevents navigation for commerce and recreation.

Waterhyacinth was introduced into the United States from South America sometime before 1884. First official account of waterhyacinth was at the New Orleans Cotton Exposition in that year. It bears the nickname of "Million Dollar Weed" in Florida, though cost of its control has long since passed that mark. It is also a pest in areas of California.

A somewhat oval leaf-blade with parallel veins is borne on the end of an inflated bladderlike petiole. It is this bladder which bouys up the plants. Many petioles grow outward in a rosette pattern from a central axis.

Six-petaled flowers are showy and vary in color from white to bluish hues. Many flowers are borne on a single flower stalk which emerges from the central axis. Many tiny seeds are produced, but only about 5% germinate. Enough seedlings may become established in shallow water, decaying vegetation, or on mud along shorelines to reinfest bodies of water from which all waterhyacinth plants have been eliminated.

Waterhyacinth has a densely fibrous root system which dangles in the water but may become attached to mud for a time during periods of low water.

Underwater rhizomes, submerged stemlike structures, are the major means of this weed's spread. After a lateral growth of about six inches away from a parent plant, the rhizome sprouts a new plant. Ten individual plants can cover an acre of water after ten months growth. When a mat of waterhyacinth covers a stream, it so shades out sun that no other plants grow, and in shallow areas the oxygen may be so low under the mat that no fish survive. Mats block water flow and have been known to cause sewage backup in Florida. Matted plants, at times, float downstream and jam against bridges. Many mechanical and chemical controls have been tried; 2,4-D has been the most successful chemical used to date. However Amitrol-T and Diquat have recently been shown to be effective. Chemicals are applied as foliage sprays in a continuing program to eliminate this pest at its source.

Prepared in cooperation with Crops Research Division, Agricultural Research Service, United States Department of Agriculture, Beltsville, Maryland.

Aquatic Weed Control
(from page W-17)

single midrib vein on each leaf from which small lateral veins are given off. Overall venation may be obscured by the smooth fleshiness of leaves. *Nymphea* or white waterlily, on the other hand, has veins which radiate evenly from the petiole point of attachment. Identification of leaves can be used when plants are not flowering.

*Nuphar*'s sparsely petaled flower will be yellow; *Nymphaea*'s many-petaled flower will be white, rarely yellow, pink, or blue. After petals have dried and fallen, the globular seed receptacles will look alike on both species, so leaf venation identification again should be used.

Although *Nymphaea* is considered a true floating-leaf aquatic, some species of *Nuphar* are more erect. Stout petioles lift the arrow-shaped leaves out of the water.

The aquatic plants previously discussed do not constitute all pest species encountered. At one time or another, any number of species may become sufficiently plentiful to be bothersome. This listing is intended to offer a brief cross section of the more troublesome species at present.

Chemicals for control of these plants will be dealt with in the second installment of this series, which appears next month. Equipment for application will appeal in the final segment of this three-part article.
For fall application, order TRITAC™, the efficient weed killer

Use it now—when the fall rains can carry it down to the root zones.

TRITAC, a liquid, nonselective weed killer controls deep-rooted perennial weeds under a wide range of climatic conditions.

As little as four to eight gallons per acre of this powerful liquid herbicide will control bindweed, Canada thistle, leafy spurge, Russian knapweed—for a season or longer.

It is recommended for spraying along highways, fence rows and other noncrop land.

Two formulations. Regular TRITAC is for normal conditions and TRITAC-D, which contains 2,4-dichlorophenoxyacetic acid, is recommended when quick foliage top kill is desired. Both are available in one-, five- and 30-gallon containers through your distributor.

Technical help. Our agronomists will be glad to work with you on your weed-control plans. For technical data and name of your nearest distributor, please write Hooker Chemical Corporation, 410 Buffalo Avenue, Niagara Falls, New York, 14302.
These seven chemical formulations—developed by Amchem—can answer any or all of your customer needs in general vegetation and brush control. Amchem offers you both the products and the proved-in-use programs that enable you to operate a successful, repeat business as a contract applicator. You get quality you can count on, because at Amchem, weed and brush control is our only business.

Nostalgia Department. We were reminiscing recently about some of the many contract applicators who corresponded with us during the months of intensive poll-taking and research which preceded the establishment of Weeds and Turf, and we were pleased to come across a memo from Archie Wheaton, who is supervisor of the Lucas Tree Expert Co., in Norridgewock, Maine. Archie wrote us that his firm felt it had achieved real success in contract brush control, and wondered if the aquatic field might not offer additional bright opportunities for diligent applicators. This was timely wool-gathering for us, because this issue marks the beginning of our three-part article on water weed control. Hope Archie enjoys what our technical staff has to say... and if anyone wonders why we waited until now to publish the article, suffice it to say that this was a most ambitious endeavor, and was a long time in preparation!

Business will be booming. Perhaps it's not something to approach with levity, but we've learned that a group of atomic experts predict that should a nuclear war come about, it is probable that a hardy survivor will be our old nemesis, crabgrass.

The Page boy's job. Speaking of applicators with broad fields of interest, while we were musing over some of the letters from CAs which came during the early days of the magazine, we found a communiqué from Jack Page, who runs Jack Page's Nursery in Walla Walla, Washington. Jack tells us his company has a spray service, does landscape work, and operates a nursery as well, and said he looks forward to the technical information W&T offers him each month. Jack's a landscape architect himself, and we hope this Page finds what he's looking for on our pages!

Kilmer Oak to fall. Looks like Rutgers University in New Brunswick, N.J., is going to lose its famed Kilmer Oak. The majestic tree, several years in decline and now dead, is popularly thought to have inspired Joyce Kilmer's famous poem, "Trees." There's a lot of sentiment connected with the fine old oak, which once stood 68 feet tall and had a limb spread of 108 feet. Job of removal went to Eugene Pendolino of Garden State Tree Specialists in North Plainfield, N.J. Gene's only compensation, our news correspondent says, was a crosssection of the trunk which he wants for an office decoration. (Requests for crosssections have been widespread.) The tree was slated for demolition last month.

Turfgrass honors. Our turf management friends in Florida like to give awards, it seems, and the latest bevy of prizes was handed out at the recent turfgrass conference (p. W-35). Honored for outstanding service to the industry were Ed Miller and Marvin Bailey, researchers at the University of Florida, and Cliff Rasmussen, who's experimenting on turf at the experiment station in Ft. Lauderdale. Also cited were industry figures Howard Bardsley of Homestead and Dave Turner of Ft. Lauderdale. Often-honored Col. Frank Ward, a former FT-GA leader, received commendations, too. Congratulations to all!
Reach more pest control markets with these HUDSON power sprayers

Peerless power sprayer cuts time-wasting stops for service and repairs. New Ten-O-Matic® pump has no gears, no sliding pistons, no connecting rods, no packing, no cups—almost nothing to wear, break or chip. Handles any sprayable materials at pump capacities up to 10 gallons per minute; pressures to 400 pounds. Available in 150, 200, and 300-gallon tanks with either stainless steel or Endurall® bonded liners.

Peerless compact power sprayer handles any sprayable materials with pressures up to 400 pounds and at five gallons per minute output. Compact size and three wheel design provides exceptional maneuverability; easy to move by hand into places other high output sprayers cannot go. Two-wheel and skid models in 50, 100, 150, and 200-gallon tanks with either stainless steel or Endurall® bonded liners. Also Matador® 15 to 100 gals.

Peerless compact power sprayer

Porta-power spray pump combines high output performance with unrestricted range in a moderately priced unit. Carry it on your pick-up truck; take it in a boat. Pump from barrels, tanks, or any other type of container. Positive piston pump handles all sprayable materials. Porta-power pumps are available in models with outputs of five gallons per minute at 400 pounds or three gallons per minute at 250 pounds.

Schefenacker power mist sprayer goes wherever you can walk or crawl; lets you penetrate areas inaccessible to any other type of power sprayer. Weighs only 32 lbs. (empty). Adjustable straps and padded, ventilated back make Schefenacker comfortable and easy to carry. Operating controls are in front at your fingertips. Two models: one for mist spraying only; the other for mist spraying, dusting, and wet dusting.

Be sure to see these Hudson power sprayers, plus our hand-operated sprayers and dusters at the National Pest Control Association Convention, Booth No. 5. Or, if you can't make the show, write to us for complete product information.

SIGN OF THE BEST BUY

H. D. HUDSON MANUFACTURING COMPANY
589 E. Illinois St., Chicago, Illinois, U.S.A., 60611

WEEDS AND TURF Pest Control, October, 1963
Industrial weed eradication is a fast growing market. Custom application of herbicides is widespread, and the practice is growing. Industries and municipalities have become increasingly aware of weed problems, and are seeking ways to effectively eliminate this nuisance and potential fire hazard.

Many PCO's depend upon Simazine and Atrazine, Geigy's outstanding herbicides, for industrial weed control. These herbicides can be used to eliminate almost all vegetation. One timely application, according to label directions, controls annual and perennial weeds for a full season or more. Simazine and Atrazine are safe to humans and animals, non-irritating to skin, non-flammable, non-corrosive and dependable in the results they provide.

INDUSTRIAL WEED CONTROL MARKETS
Roads, paths, industrial plants, sidings, race tracks, parking lots, around billboards, tennis courts, playgrounds, drive-in-theatres, firebreaks, fence rows, utilities, lumber yards, oil tanks, water works, and many, many other sites in your service area.

For free 12 page, full-color brochure on Industrial Weed Control, address Department PC-38.