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Monsanto

Circle No. 151 on Reader Inquiry Card

crabgrass and dallisgrass invade more turf acreage in the southern United States than any other grasses. Germinating seeds of both can be satisfactorily controlled with benefin, bensulide, DCPA, atrazine, and simazine. Certain formulations of atrazine are labeled for use on St. Augustine, zoysia, and centipede for sod production while other commercial products containing atrazine are labeled for homeowner use.

Only asulam is used for postemergence control of crabgrass and dallisgrass in St. Augustine. MSMA and DSMA are effective postemergence herbicides for these weeds in bermudagrass. The arsonates are used almost exclusively for dallisgrass control in bermuda and zoysia.

Goosegrass is the most difficult summer grass to control in the South. Timing of application of preemergence herbicides is of paramount importance if control is to be achieved. We generally think goosegrass starts germinating in significant quantities four to six weeks after crabgrass. However, this can and does vary.

If application of a preemergence herbicide is delayed, large crabgrass will escape because it germinates earlier than goosegrass. In bermuda and zoysia, large crabgrass can be controlled quite effectively with postemergence applications of the arsonates. Use of preemergence herbicides would appear to be a better approach to goosegrass control than postemergence control with arsonates.

Oxadiazon (Ronstar) gives excellent season-long control of goosegrass, but it is more expensive than other herbicides. Research has shown postemergence applications of MSMA plus metribuzen (Sencor) gives good control of goosegrass.

Sandbur and bahiagrass in bermuda and zoysia can be controlled with arsenicals. There is no selective control of torpedograss



in southern turf at the present time.

Both annual and perennial sedges are problems in the South. Purple nutsedge and, to a lesser extent, yellow nutsedge are the most severe problems. Multiple applications of arsenicals or an arsenical/phenoxy combination are generally recommended for purple nutsedge, only on bermuda or zoysia. Basagran can be used for yellow nutsedge control.

Summer broadleaf weeds Broadleaf weeds are a problem throughout the South in turf, but not to the extent of the grassy weeds, such as dallisgrass, large crabgrass, and goosegrass.

Prostrate spurge and Virginia buttonweed are important and difficult to control broadleaf weeds. Multiple applications of 2,4-D plus dicamba, Trimec or Trex-San are almost always necessary. Researchers suggest the use of a nonionic surfactant with the herbicides.

Highway weed control Herbicides are being used more extensively each year on southern roadsides. Several states, including Alabama, California, Louisiana, Virginia, North Carolina, and Florida have well-developed vegetation management programs.

The primary reasons for the increasing use of herbicides in roadside management are increased safety from more prolonged control of tall growing species and reduced maintenance costs.

Most of the vegetation management programs in the South are designed to convert the turf to monostands of either common bermudagrass or bahiagrass.

Multiple applications of the arsonate herbicide MSMA, in conjunction with 2,4-D, are common. However, sulfometuron-methyl (Oust) has shown very promising results in areas having greater than 50 percent stands of bermuda at the time of application. In bahiagrass areas, diuron and atrazine have given promising results in most states.

Once the roadsides are converted to common bermuda or bahiagrass, cool-season weeds become the major problem. Tall fescue is a real problem in this situation due to its prolific seed-head production in the early spring. Winter application of glyphosate or sulfometuron have shown promise in control of this species in Alabama.

Vegetation management programs necessarily vary from state to state due to the profound differences in environmental conditions and public acceptance. However, there is no doubt that the substitution of herbicide spraying for the slower, more costly, and dangerous mowing will increase as new technology in chemicals and application methods are developed.

Weed control strategy for cool season turf

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TURF

bicides for grassy and broadleaf weeds in cool-season turf are benefin (Balan), bensulide (Betasan, Betamec-4, Pre-San, Lescosan), DCPA (Dacthal), oxadiazon (Ronstar), and siduron (Tupersan).

Siduron is the only pre-emergence herbicide that can be applied near time of seeding. Bensulide and DCPA can be applied in the spring following a fall seeding.

Benefin and oxadiazon should be applied to established turf. Bensulide can affect rooting of existing bermudagrass and caution is advised for use of most pre-emergence herbicides on bermudagrass greens. Thinning of fine fescue stands from pre-emergence herbicides has also been reported.

Pre-emergence herbicides should be watered in to get the chemical to the seed prior to germination. They should be applied two weeks prior to the expected germination time and should last throughout the period. Second applications may be necessary to achieve this. Contact your local extension agent for germination times for primary weeds.

The primary post-emergence herbicides for grassy weeds in turf are the arsenates; MSMA, DSMA, CMA, and MAMA. Treated areas should not be reseeded for a month or more after application. See labels for delay period.

Bentgrass and fescue are more sensitive to arsenates than other cool-season grasses. CMA is the safest for bentgrass.

Weed foliage should be sprayed while still young (two to three leaf stage) if possible. The effectiveness of arsenates improves with temperature and rates need to be increased for temperatures below 80 degrees F.

The primary post-emergence herbicides for broadleaf weeds are 2,4-D, 2,4-DP, dicamba (Banvel), and MCPP. Garlon (Trychlopyr) has shown promise for control of some of the more difficult-to-control broadleaf weeds, such as knotweed and yellow wood sorrel.

These herbicides should not be applied until a new lawn has had at least three mowings. The target weed weeds should be actively growing for best results. The temperature should be at least 60 degrees F. Applications during extreme heat or drought can cause severe damage to desirable turf.

Two treatments of post-emergence herbicides are generally necessary to control broadleaf weeds. See labels for the proper interval between applications.

Winter annuals can be sprayed early in the year, followed by summer annuals and perennials. Fall treatment for perennials is possible.

Post-emergence herbicides are often combined to achieve improved control and reduce application time.

Occasionally, a landscape manager chooses to fumigate a seedbed prior to planting to reduce weed seed, control insects and fungi, and eliminate off-type grasses. Methyl bromide (Dowfume), metham (Vapam), dazomet (Mylone) and Vorlex are used for pre-plant fumigation. See labels for delay period after fumigation for seeding or planting.

Renovation of turf stands is gaining acceptance, especially since the development of glyphosate (Roundup) for turf. During renovation all existing vegetation is killed and the area is reseeded in a matter of weeks. Glyphosate is deactivated within a few days following application, but a delay of two weeks is recommended. Amitrole, cacodylic acid (Phytar), and dalapon can also be used, but the delay period before seeding is longer.

Highway weed control Highway landscape managers have had two reasons to hold back on use of herbicides recently, increased sensitivity by the public to chemicals and tightened budgets. After all, mowing utilized equipment and

crew on hand and did discourage tall or woody plants from blocking the view of drivers.

Roadsides are intended to be the lowest maintenance of turf areas. The need is really a groundcover which prevents erosion, does not block driver vision, and requires little to no care.

But, any area left untended for very long will return to a natural state with taller plants blocking drivers' vision. Current standard operating procedures solve these problems with the primary control being mechanical.

Weed control along fences, dividers and signs however, is predominately chemical today. Mechanical control of these areas is impractical. Nonselective, long residual herbicides are standard. A few new herbicides for these areas are on the way. Application equipment for these areas fits the needs.

Part of the problem for larger areas of turf or groundcover may be equipment. Existing chemicals for selective weed control on roadsides are effective, but the application equipment does not adequately consider drift, even distribution, or the feelings of the public regarding chemicals. Boom sprayers or the new wick-type applicators would better meet these considerations but they are impractical for use on steep slopes or embankments.

The solution for steep or difficult-access areas is a groundcover such as crown vetch. However, crown vetch, a legume, should not be sprayed with phenoxys. Drift must be watched when spraying areas where cool-season grasses are adjacent to crown vetch.

Stands of hard or tall fescue have been tried on steep slopes in the Los Angeles area with success. Other native grasses, such as buffalograss, are being used in Western Plains states to eliminate the need for irrigation. Initial selection, or even renovation in some areas, to native grasses can greatly reduce maintenance.

WT&T

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ANNUAL BLUEGRASS
(*Poa annua* L.)
Low-growing, compact, tufted winter annual with flattened stems which may be close to ground. Leaves are soft, light green and boat-shaped at tip. Can produce seed heads when mowed at 1". May die suddenly in summer.
CONTROL WITH LESCOSAN
LESCO DEVIRNOL (pre-emergence).



DALLISGRASS
(*Paspalum distatum*)
Bunchy warm season perennial. Seedhead similar to crabgrass with nearly round seeds. Branch differently than crabgrass.
CONTROL WITH MSM, DSMA
(post-emergence).

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QUACKGRASS (COUCHGRASS)
(*Agropyron repens* L.)
Cool season perennial rhizomatous. Spreads extensively by long white underground stems. Leaves have the width of bluegrass and rough-textured. Claw-like prickle on the stem. Ring of root-hair every 1/2 inch along underground stem.
CONTROL WITH ROUNDUP (SPOT TREATMENT) (post-emergence).



TALL FESCUE (KENTUCKY 31, ORCHARDGRASS)
(*Festuca arundinacea*)
Perennial with coarse leaves forming sharp angles to stem. Grasses in clumps with no creeping stems. Soft hairs on leaves that are dull and ribbed on top, shiny beneath. Leaf veins strongly pinnate.
CONTROL WITH ROUNDUP (SPOT TREATMENT) (post-emergence).



CHICKWEED (STARWEED)
(*Stellaria media*)
Annual winter-broached creeping plant with smooth, pointed tender leaves and stony white blossoms. Grows best in cool, moist weather. Reduced by hot weather.
CONTROL WITH LESCO DEVIRNOL (pre-emergence) LESCO DICAMBA *2,4-D, LESCOPEX, LESCOFAR, LESCO EIGHT-ONE, LESCO TEN-ONE (post-emergence).



MOUSEEAR CHICKWEED*
(*Cerastium vulgatum*)
Fuzzy, dark, oblong-leaved perennial with hairy prostrate stems. Flowers throughout summer. Flowers have large sepals.
CONTROL WITH LESCO DEVIRNOL (pre-emergence), LESCOFAR, LESCO DICAMBA *2,4-D, LESCOPEX (post-emergence).



CRABGRASS (HAIRY CRABGRASS, LARGE CRABGRASS, SMOOTH CRABGRASS, FALL GRASS)
(*Digitaria* spp.)
Annual. Stems mostly prostrate, branch freely, send down roots at each joint that comes in contact with soil or moisture. Seed head divided into several finger-like segments.
CONTROL WITH LESCOSAN OR LESCO DEVIRNOL (pre-emergence), DSMA (post-emergence).



DANDELION (BLOWBALL)
(*Taraxacum* spp.)
Cool season perennial with yellow blossoms in spring which turn to fluffy seed heads. Long, thick taproot. Leaves green like new shoots. Thistles in weak lawns with leafier grass. Seedlings may appear in spring, summer or fall.
CONTROL WITH LESCOFAR, LESCO DICAMBA *2,4-D, LESCO EIGHT-ONE, LESCO TEN-ONE, LESCO A-4-D (post-emergence).



DAISY
(*Chrysanthemum leucanthemum*)
Perennial which reproduces by rhizomes and seeds. Smooth stems which grow up to three feet high. Compactly lobed alternate leaves. Flower heads grow singly at end of stems. White petals flowers with yellow disks. Especially a problem in low fertility areas.
CONTROL WITH LESCO EIGHT-ONE, LESCO TEN-ONE, LESCOFAR, LESCO DICAMBA *2,4-D (post-emergence).



CURLY DOCK
(*Rumex crispus* L.)
Crimk-edged leaves with flowering stalks that may reach 2 to 3 feet in height. Perennial. Reproduces by seed. Soil salinity flowers in leaves. Plant forms large rosettes.
CONTROL WITH LESCOFAR, LESCO DICAMBA *2,4-D, LESCO EIGHT-ONE, LESCO TEN-ONE (post-emergence).



GROUND IVY (GILL-OVER-THE-GROUND, CREEPING CHARLEY)
(*Glechoma hederica* L.)
Perennial. Round, scalloped leaves. Lavender to blue funnel-shaped flowers bloom in early spring. Square stems may root at joints which touch the ground. Thives in shade but will also grow in sun.
CONTROL WITH LESCOPEX, LESCO EIGHT-ONE, LESCO TEN-ONE, LESCO DICAMBA *2,4-D (post-emergence).



THISTLE
(*Cirsium nutans*)
Biennial, forms in rosettes, spring flowers large powder puff in shape, deep rose to violet in color.
CONTROL WITH LESCO A-4-D, LESCO DICAMBA *2,4-D, LESCO EIGHT-ONE, LESCO TEN-ONE (post-emergence).



HEALALL (SELF HEAL)
(*Prunella vulgaris*)
Perennial with pinkish flowers on stubby spikes with overlapping green bracts. Square stems show relationship to mint family.
CONTROL WITH LESCO DICAMBA *2,4-D, LESCO EIGHT-ONE, LESCO TEN-ONE, LESCO A-4-D (post-emergence).



HENBIT (HEADNETTLE)**
(*Lamium amplexicaule*)
Winter annual or biennial with square leaves, upright stems. Early spring flowers are lavender to blue with two lips. Furrowed upper leaves. Bottom leaves have stalks. Four-sided stems may bend and root.
CONTROL WITH LESCOFAR, LESCO DICAMBA *2,4-D, LESCO EIGHT-ONE, LESCO TEN-ONE (post-emergence).



PROSTRATE KNOTWEED*
(*Polygonum aviculare*)
Germinates in early spring. Sometimes mistaken for grass in its immature stage. Annual growing flat from long white ligament. Wiry, leafy stems. Three-angled seeds which are first light brown then black at maturity. Individual plants may have a spread of two feet or more.
CONTROL WITH LESCO DEVIRNOL (pre-emergence), LESCOFAR, LESCOPEX, LESCO EIGHT-ONE, LESCO TEN-ONE (post-emergence).




LAWN PENNYWORT
(*Hydrocotyle sphenolobos*)
Creeping perennial with leaves similar to ground ivy, but smaller, brighter, shiny. Thives in moist, shady conditions.
CONTROL WITH LESCO A-4-D, LESCO DICAMBA *2,4-D, LESCO EIGHT-ONE, LESCO TEN-ONE (post-emergence).



MALLOW
(*Malva* spp.)
Long, fleshy white taproot. Blush-white flowers. Seed portion shaped like disk and breaks into numerous pre-shaped segments.
CONTROL WITH LESCO DEVIRNOL (pre-emergence), LESCOFAR, LESCO EIGHT-ONE, LESCO TEN-ONE, LESCO DICAMBA *2,4-D (post-emergence).



BLACK MEDIC (YELLOW TREFLOID)
(*Medicago lupulina*)
Slender, branching, spreading stems 1 to 2 feet long. Leaves have three leaflets. Flowers 1/16 inch long, yellow in dense, globular spikes on short branches from stem. Black, thick, soil covered pods with thick walls. Reproduces with seed, shallow taproot. Most noticeable in lawn. During summer.
CONTROL WITH LESCOFAR, LESCO EIGHT-ONE, LESCO TEN-ONE, LESCO DICAMBA *2,4-D (post-emergence).



MOSS
Perennial plant form with many species. Prefers cool, moist environment. Often found in shaded areas and on poorly drained soil.
CONTROL WITH LIME, COPPER SULFATE.



NIMBLEWILL (MULLENBERGIA)
(*Muhlenbergia schrebieri*)
Wiry-like, creeping perennial which produces mats of short-bladed gray-green leaves. Tops killed by frost and are often covered by spring. Forms circular patches or may be distributed throughout lawn.
CONTROL WITH ROUNDUP (SPOT TREATMENT) (post-emergence).

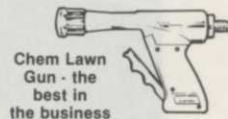


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LANDSCAPE

by Dr. Elton Smith

Rising labor costs have caused an increase in the use of both preemergence and postemergence herbicides in landscape maintenance.

The landscape manager has to control weeds around a variety of desirable plant material, including deciduous and evergreen shrubs, bulbs, annual and perennial flowers, and ornamental grasses. He uses herbicides to control weeds under trees, in sand traps, around grave markers, in patios, along fences, in plant beds and groundcover, and in containers.

The effectiveness of a weed control program depends on proper selection, calibration, calculation, and application of herbicides. Reading the label is critical to see what desirable plants may be intolerant to certain

herbicides.

The weeds involved are much the same as in turf. Annual weeds, such as crabgrass, foxtail and purslane are relatively easy to control by a combination of mulching, cultivation, hand pulling, and preemergence weed control. Perennial weeds, such as bindweed, thistle, quackgrass and nutsedge, are more difficult to control because of extensive root systems.

It is important, especially with perennial weeds, to eliminate them prior to planting. There are virtually no selective postemergence herbicides to help you out when weeds take over. The variety of plant material makes it impossible for herbicides to distinguish between weeds and desirable plants. Non-selective foliage-applied postemergence



herbicides can be used only with extreme care if they do not leave residue in the soil. For example, Roundup can be applied to the foliage of weeds with a wick applicator or glove.

Prior to planting

The most successful approach to a weed-free landscape is to control perennial grasses and broadleaf weeds prior to preparing the area for planting.

Spraying the weeds in an area with one of several postemergence systemic herbicides, which will be translocated to the root system for total plant control, is one of the most effective methods of control. Examples of such herbicides are 2,4-D and related products for broadleaf weed control, dalapon for grass control, and amitrole for general weed control. Each of these normally has to be applied more than once and most have a specific waiting period prior to planting. Glyphosate (Roundup), a very effective product for perennial grass and broadleaf weed control, has no soil residue.

A number of preemergence herbicides are labelled for landscape plants and two are recommended for use prior to planting. Eptam or Treflan can be incorporated into the soil, following tillage, to control annual and some perennial weeds for a period of four to six weeks. Following incorporation to a depth specified on the label, ornamentals can be

continued on page 67



planted. This method has been used extensively by commercial nurserymen and is now being used by landscape contractors to a large extent, especially where maintenance for a specified period of time is in the contract.

Tillage as a method of weed control prior to planting is a successful practice for the control of annual weeds but not perennial weeds. In some cases, tillage only cuts up the root systems of perennials into smaller pieces and distributes them.

Following planting

In recent years the landscape industry has made extensive use of mulches to prevent weeds in the landscape.

Mulches should be applied about two-inches deep and renewed to that depth annually. Mulch layers much deeper than two inches accomplish little and may actually harm shallow-rooted ornamentals according to new research at the University of Maryland.

Many types of mulches are available, however, the most popular include hardwood, Cypress and pinebark mulches along with wood chips, peat moss, and an assortment of hulls and inorganic materials. Barks and inorganic materials will not rob nitrogen from the soil as raw organic material will. When using compost, make sure it has had enough time to fully break down during composting and weed seed in it is sterile.

Some weeds will come through the mulches. These must be hand pulled or sprayed. Seeds will be carried into planting beds by wind and birds and will often germinate in the mulch. Again, hand pulling is the most satisfactory control measure in small areas, however, landscape personnel are using more and more herbicides, such as glyphosate.

Several preemergence herbicides can be used as an alternative to, or in combination with

mulches. They control annual weeds for a period of four to eight weeks. Reapplications are usually necessary to achieve season-long control depending on selection of herbicide, soil, and climatic conditions.

Typically the first application of preemergence herbicides should be made prior to weed seed germination. Subsequent treatments can be made as needed, based upon regrowth of annual weeds. The soil should be weed-free and moist prior to application or the treatment should be followed by irrigation or rain.

It is important to know how much area is included in the beds to be treated. Once the area is calculated, determine the amount of herbicide needed for that area based upon the label recommendations. Apply the herbicides with equipment that is properly cali-

brated and in good working order.

Postemergence herbicides for landscape weed control

Postemergence herbicides are used for general weed cleanup around buildings, waterways, ditchbanks, fence rows, etc. Used with extreme care, these materials may be used in tree plantings. However, avoid herbicide contact with foliage and green, yellow or immature bark.

Pre- and postemergence herbicide combinations

Preemergence and postemergence herbicides can be combined to kill existing weeds and prevent emergence of others. Combinations of paraquat or Roundup with Princep, Phytar 560, or Surflan have been used extensively in trees with excellent success. **WT&T**

continued on page 70

Calculating rates and quantities

Granular Materials

Example—A landscaper needs to treat 4,000 sq. ft. of Juniper with 4% RONSTAR granules at 4 lbs. aia. How much RONSTAR is required?

Formula

$$\text{lbs. aia} \times \frac{\text{sq. ft. to be treated}}{44,000 \text{ sq. ft./acre}} \times \frac{100}{\% \text{ granular}} = \text{lbs. required to treat area}$$

Calculation

$$4 \text{ lbs. aia} \times \frac{4,000}{44,000} \times \frac{100}{4} = 9.1 \text{ lbs. 4\% granular RONSTAR}$$

Wettable Powders

Example—A landscape firm needs to treat 4,000 sq. ft. with 50% DEVRINOL wettable powder at the rate of 10 lbs. aia.

Formula

$$\text{lbs. aia} \times \frac{\text{sq. ft. to be treated}}{44,000 \text{ sq. ft./acre}} \times \frac{100}{\% \text{ powder}} = \text{lbs. required to treat area}$$

Calculation

$$10 \text{ lbs. aia} \times \frac{4,000}{44,000} \times \frac{100}{50} = 1.8 \text{ lbs. 50\% DEVRINOL W.P. to be mixed in enough water to cover 4,000 sq. ft.}$$

Liquid Concentrate

Formula

$$\text{lbs. aia} \times \frac{\text{sq. ft. to be treated}}{44,000} \times \frac{1}{\text{lbs. active ingredient/gallon}} = \text{gallons required to treat area}$$

Calculation

$$2 \text{ lbs. aia} \times \frac{22,000}{44,000} \times \frac{1}{4} = .25 \text{ or } \frac{1}{4} \text{ gal. TREFLAN to be mixed in enough water to cover } \frac{1}{2} \text{ acre}$$



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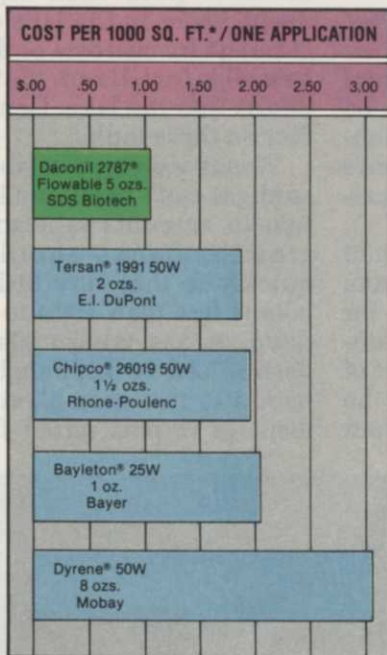
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*Costs based on manufacturer suggested retail unit price as of January, 1984.

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Always follow label directions carefully when using turf chemicals.



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AQUATIC

Lakes, ponds, and streams are central features to many landscapes. The best maintained landscape around a weed-infested lake is a failure. Both land and water must work together for a complete landscape.

A water feature without plants is not the objective either. Plants produce oxygen needed for a healthy, balanced water environment. The lake should be designed as you would any landscape and maintained to preserve the design.

Whereas some water plants are usually a nuisance, such as hydrilla, watermilfoil, algae, and spinyleaf naiad, others can be managed to provide an attention-getting display. These include water lily, lotus, arrowhead, cattail and others.

Control measures are limited by the desirable plants in the lake and the use of the lake water for irrigation, fish farming, air conditioning, etc. If the lake is part of a watershed area, there may be restrictions on the use of certain

chemicals or weed-eating fish. Check with the extension service in your area before instituting an aquatic weed control program.

Preventative control

Aquatic weeds have the same needs as other plants; light, nutrition, and certain growing conditions. As on land, you want to encourage the desirable plants and discourage the weeds.

Typical conditions causing an aquatic weed problem are shallowness (less than eight feet deep), water in the lake does not circulate by currents or flow, and heavily-fertilized watershed drains into the lake. Concentrate first on these faults.

Weeds won't get established if sunlight can't reach the lake bottom in amounts satisfactory for growth. Banks should drop quickly so that very little of the lake is less than eight to ten feet deep. Areas where plants are desired can be kept shallow. An option to this is to plant aquatic displays in pots raised from the



lake bottom.

If this is impractical, dyes or *Chlorella sp.* algae can be used to shade out the sunlight at the surface. Another method gaining acceptance is Aquascreen, a fiberglass cloth which is placed over the lake bottom where weeds are not wanted. Bottom-rooted aquatic plants will not grow through the material. It can even be placed over growing vegetation if necessary.

Algae likes stagnant, warm
continued on page 74

