shrub and tree plantings.

A granular formulation of dichlobenil is registered for control of certain submersed aquatic weeds. Applications of 7 to 10 lb/A a.i. are recommended on exposed bottoms or shorelines of ponds or lakes. Rates of 10 to 15 lb/A a.i. are recommended for applications made over the water surface in early spring before the weeds begin rapid growth.

A liquid formulation of fenac (2,3,6-trichlorophenylacetic acid) is registered for control of submersed aquatic weeds in ponds and lakes from which water is not used for irrigation. Applications of 10 to 13 gals. of fenac per acre in 50 to 100 gals. of water are recommended on exposed bottoms or shorelines of ponds and lakes. Water should be kept off of treated areas for at least 3 weeks (or longer in regions of low precipitation) to allow time for the slowly soluble herbicide to become thoroughly fixed in the surface soil by rain or snow.

Two new dimethylalkylamine salts of endothall (7-oxabicyclo (2.2.1) -heptane-2,3-dicarboxylic acid) are now available for control of submersed aquatic weeds and algae. They are effective on weeds at much lower concentrations than are the potassium and sodium salts of endothall that have been in use much longer. However, the amine salts are not safe for fish, whereas the potassium and sodium salts do not injure fish.

Aquatic Herbicides Restricted

The most important recent development affecting control of aquatic and bank weeds has been the restricted use of herbicides in or near canals, ponds, lakes, and streams. Most herbicides approved for control of aquatic or bank weeds include on the label the warning: *"Do not contaminate water to be used for irrigation or domestic purposes."* These restrictions are imposed, not because the herbicides are known to be toxic to warmblooded animals, but because not enough information is available to make certain that they are not toxic. One notable exception is a formulation of ammonium sulfamate which is registered for weed and brush control around domestic water supplies, lakes, and other bodies of water. Copper sulfate, the herbicide used extensively since 1904 to control algae, is still permitted in domestic water supplies at concentrations up to 4 ppmw of copper sulfate pentahydrate, equivalent to 1 ppmw of copper ion.

Some research has been initiated to determine the fate of certain herbicides in irrigation water, bottom soil, aquatic plants, and in certain crops and soils irrigated with treated water. Probably much more such research will be necessary before adequate use of effective and safe herbicides will be permitted for control of aquatic and bank weeds.

Illinois Turf Course Set

The University of Illinois will conduct its Third Turf Short Course from Jan. 30 to Mar. 10 at the University. Contact Short Course Supervisor, 104 Mumford Hall, University of Illinois, Urbana, Ill., for more information.

How to Stake A Young Tree

By
W. DOUGLAS HAMILTON
Farm Advisor
Alameda County, California

LET'S begin this discussion of staking street trees by assuming that staking is unnecessary. It costs a lot of money; it takes time to stake and restake a tree; farmers rarely stake any of their orchard trees. Why, then, is it necessary or even a good idea to stake landscape street trees?

To get the answer, let's compare orchard with street tree plantings: In both situations, there is a limited root system for the size of the tree. However, farmers often cut new trees 18 to 30 in. from the ground at planting time. Street tree planters, on the other hand, often leave all top growth on trees as they come from the nursery, so that the problem of a limited root system is more acute.

Orchardists want low-headed trees. Street trees must be headed high, which presents the built-in necessity of supporting the head against wind and keeping it upright until the root system is large enough to do the job. Also, the long, thin main stem of the new street tree is often simply not strong enough.

An important difference between orchard and street tree plantings is the "after planting human element." In short, street trees are wide open to frequently unintentional damage or destruction by cars, lawnmowers, children, etc.

The author wishes to acknowledge the assistance of William B. Davis, Extension Ornamental Horticulturist, University of California, in preparing this article.

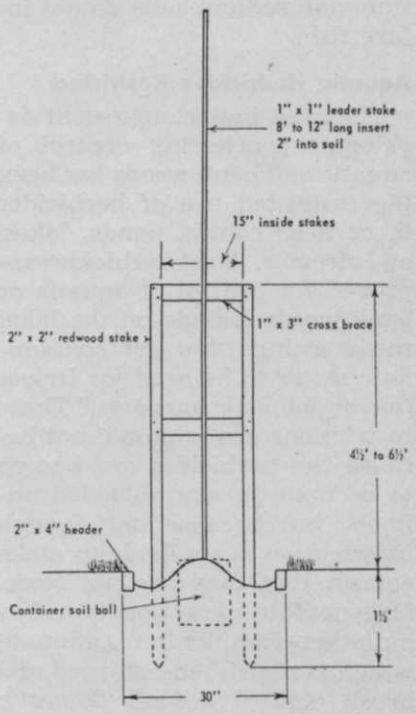
Staking Is Necessary Evil

Staking street trees appears to be a necessary evil. Once this is accepted, the next step is to determine how to do the job effectively for the least cost. It is important, then, to consider the requirements for a proper staking job. Effective staking must:

1. Last at least three years in the landscape.
2. Support the young tree, but allow it flexibility, particularly in the head.
3. Be large enough and strong enough to support the tree throughout its training period, and protect it from mechanical damage.
4. Be placed so it will not interfere with growth development of the root system.
5. Not be so large that it overpowers the young tree at time of planting.
6. Be tall enough to support the leader from which scaffold branches will arise.
7. Afford support for protective shade.

Few stakes will meet all of these requirements. For example, the 1-in.-square nursery

Above, author Hamilton describes the double, or "Pomona," stake for protecting a young tree, a method widely used by park departments in the windy San Francisco Bay area of California. Diagrams at right clearly illustrate this effective staking technique.



stake meets the conditions of only 4 and 5. The 2-in.-square stake generally fails in requirements 2,3,4, and 6. The 2-in. by 4-in. stake, or 4-in.-square stake, generally fails in all requirements but 1. The double or triple 2-in.-square stake is an improvement, but fails to meet condition 6, and partially fails in 2 unless the tree is specially secured with loop wire ties.

Double Support Stake Works

Double 2-in.-square support stakes with rigid cross braces ("Pomona stakes") fulfill these requirements and give trees the support needed for several years in the landscape. A center 1-in.-square leader stake attached to the cross brace affords support required for the trunk and for development of scaffold branches.

By placing support stakes 15 in. apart, they will not interfere with the root ball or damage it at time of planting. When secured 18 in. into the soil and tied together with cross braces, this type of stake is far stronger than any single stake that might be used.

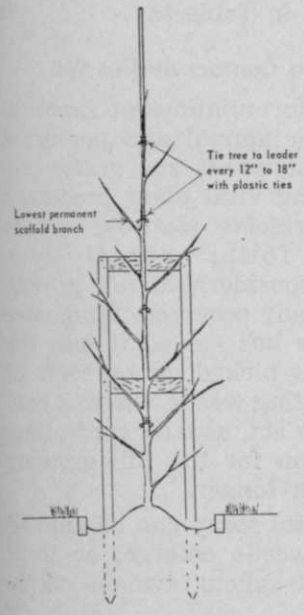
There is no way around the problem of securing the tree to the stake. Again, a small leader stake is most desirable for this purpose. A larger stake, 1 in. by 3 in. or 1 in. by 4 in., will seriously interfere with branch development, since the tree must be tied to the stake.

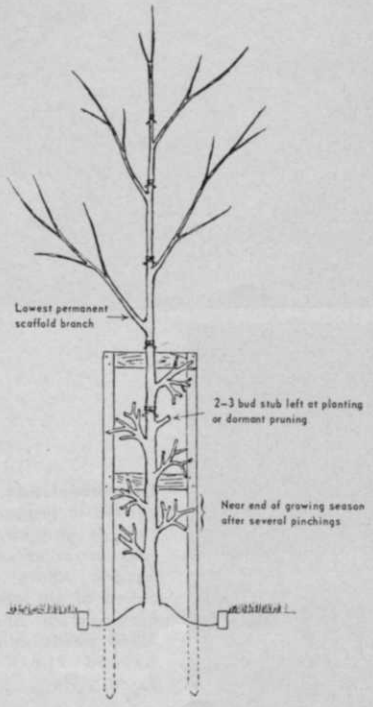
Cheapest and most satisfactory method is to tie the tree to a thin leader with 1-in. plastic nurseryman's tape. Rope or wire, even though protected by a heavy rubber shield, will cause a great deal of damage to trees.

What about kind of wood for the stake? Redwood, long noted for its lasting qualities, is brittle. One park department collected nearly 2,000 redwood stakes that broke off at the ground line for one reason or another. Heartwood from slow-growth timber is increasingly difficult to get. Redwood, sapwood, or heartwood from rapid-growth timber may be little better than pine or other untreated soft wood. Douglas fir is being tried and looks promising.

A protective material, such as copper naphthalate, pentachlorophenol, or creosote, should be used to treat the base of the stake to a few inches above ground to make it last. For best results when selecting lumber for stakes, choose a uniform grade with only small tight knots.

Important as staking a young tree is, it should be realized that this is only one facet of growing potentially beautiful and valuable trees in controlled landscapes.





AAN Makes Landscape Awards

Thirteen U. S. companies from across the country have received industrial landscaping awards from the American Association of Nurserymen. Presented at a recent luncheon in Washington, D. C., the awards are designed to stimulate interest in industrial beautification.

Award recipients for 1966 are Anheuser Busch, Inc., for its Busch Gardens at Van Nuys, Calif.; Atlantic Richfield Co., Arco Chemical Div., Anaheim, Calif.; Bullock's Fashion Square, Santa Ana, Calif.; Capitol Car Distributors, Inc., Lanham, Md.; College of San Mateo, San Mateo, Calif.; First National Bank in Dallas, Dallas, Tex.; International Minerals and Chemical Corp., Skokie, Ill.; Lincoln First Federal Savings & Loan Association, Spokane, Wash.; Peoria County Courthouse, Peoria, Ill.; Prudential Insurance Co. of America, Boston, Mass.; Raleigh Savings and Loan Association, and Wachovia Bank and Trust Co., Raleigh, N. C.; Rossmoor Leisure World, Rockville, Md.; and Washoe County Library, Reno, Nev.

Ohio Tree, Turf, Nursery Men Meet Together in Jan.

Nearly all phases of nonfarm vegetation management will be covered by the 38th Annual Ohio State University Short Course for Arborists, Turf Managers, Landscape Contractors, Garden Center Operators, and Nurserymen, at the Sheraton-Columbus Hotel, Columbus, Ohio, Jan. 23-26.

Turf topics will highlight one of the split sessions on opening day, with items of interest to commercial, utility, and municipal treemen on the other. Successive days will be devoted to landscape, garden center, and nursery interests. Ohio Nurserymen's Assn. and Ohio Chapter, International Shade Tree Conference, will also hold annual meetings.

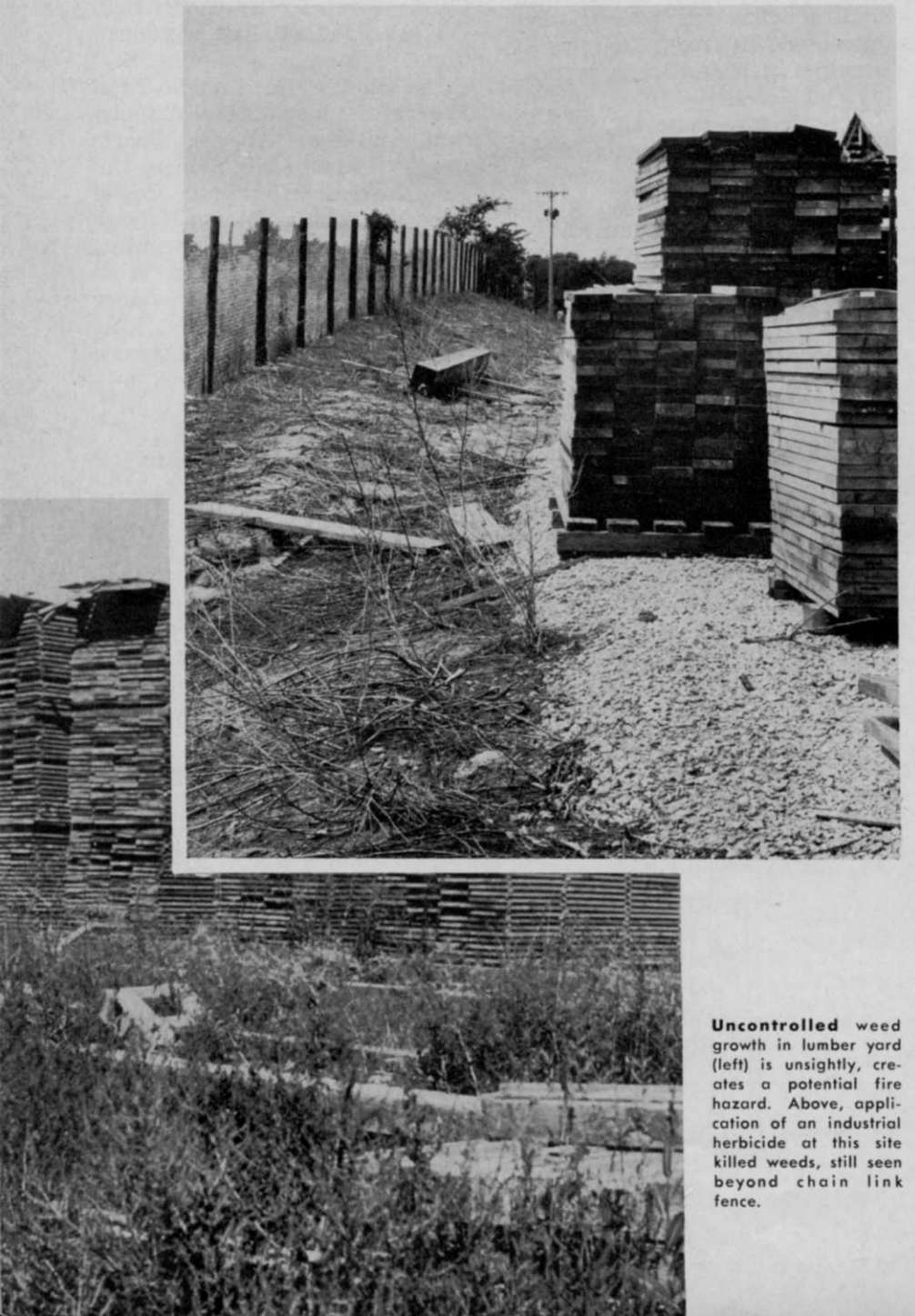
For more details, contact Dr. L. C. Chadwick, Department of Horticulture and Forestry, Ohio State University, 1827 Neil Ave., Columbus, Ohio 43210.

Portrait of an Industrial Weed Killer

By PAUL E. PEDERSEN

IN the past several years, weed specialists have been responsible for marked changes in long-established techniques of controlling weeds and undesirable grasses in industrial areas. Bermudagrass, bindweed, and crabgrass no longer need be common headaches for grounds maintenance crews and contract applicators. Even that hardy perennial, johnsongrass, which weed experts say is about the toughest of all, can be controlled with chemical weed killers.

Chemicals are becoming the widely recognized and accepted method of solving weed problems around industrial plants, buildings, petroleum tank farms, railway yards, outdoor storage areas, fence lines, along sidings, rights-of-way, above-ground pipe lines, in and around transformers, gasmetering substations, and in fire lanes and ditches. Here, unwanted vegetation can create an industrial safety hazard and contribute to fire or rust and corrosion of machinery, in addition to providing cover for insects and rodents. Quick-seeding weeds may infest not only the industrial property itself, but also neighboring properties.



Uncontrolled weed growth in lumber yard (left) is unsightly, creates a potential fire hazard. Above, application of an industrial herbicide at this site killed weeds, still seen beyond chain link fence.

Pramitol (commonly known as prometone) is Geigy Chemical Corporation's answer to the demand for industrial herbicides equal to these tasks. This nonselective herbicide (2-methoxy-4, 6-bis (isopropylamino) - *s*-triazine) is available in two formulations: Pramitol 25E liquid for spray application, and Pramitol 5P pellets for dry application.

Studies conducted with several industrial weed killers at Texas A&M University's College of Agriculture, under the direction of Professor Homer E. Rae, show that Pramitol is effective for preemergence control of weed seedlings and for postemergence control of annual and perennial weeds. These findings are summarized in Table 1.

Works on Contact and in Soil

Both formulations of Pramitol kill most annual and perennial broadleaf weeds and grasses by disrupting vital plant processes. The herbicide destroys weeds through foliar contact, even where considerable top growth has already occurred. And, once moisture has moved it into the soil, it is picked up by roots of germinating weeds, where it continues to act, usually controlling vegetation for the full growing season or longer.

Pramitol spray can be applied before weeds emerge, or until they are about two to three

months old. At rates of 5 gals. to 7½ gals. per acre, the spray controls such annuals as downy bromegrass, oatgrass, and goosegrass, and such perennials as quackgrass, puncturevine, goldenrod, burdock, and plantain. To control hard-to-kill perennials like johnsongrass, bermudagrass, field bindweed, and wild carrot, rates of 20 gals. to 30 gals. per acre are recommended.

It is noncorrosive to metal surfaces, and can be removed from conventional spray equipment by flushing with water immediately after use. Caution should be exercised when applying near crop or ornamental areas, since the herbicide is nonselective.

Apply Pellets Any Time

Because sodium chlorate and sodium metaborate are added to pelleted Pramitol, it can be applied either before, or any time after, weeds emerge. Adequate rainfall is required to move the chemical into the root zone. It can be spread with mechanical applicators, such as push-type or cyclone spreaders, or it can be applied by hand. No mixing or water is necessary, nor is application timing critical.

Application of ½ lb. to 1 lb. of Pramitol 5P per 100 sq. ft. of soil surface is suggested to control annual broadleaf weeds and grasses. For the tougher perennial weeds, use 1 lb. to 2 lb. for the same area. In regions of high rainfall or longer than usual growing season, or when extended residual control is desired, the higher application rate is recommended.

Herbicide Combinations

Development of an effective weed control program depends on such factors as vegetation and soil type and amount of rainfall. For some of the more difficult weed problems, herbicide combinations are often preferable for faster top kill and longer residual control.

A Pramitol-TCA combination provides these advantages, and can be useful when bermudagrass and johnsongrass are particularly difficult problems. On sandy or light-textured soils, infested areas can be sprayed with a mixture of 10 gals. of Pramitol 25E with 100 lbs. of TCA and 400 gals. or more water per acre. Increasing the amount of Pramitol to 20 gals., with the same rate of TCA and water, is suggested where soils are heavy or high in organic content.

Pramitol and oil combinations can increase the speed and efficiency of top kill. The herbicide goes into solution in most oils, so no agitation is required during application. Recommended rate is 10 gals. to 20 gals. of herbicide and 100 gals. to 200 gals. of oil per acre.

Lower rates can be used when weeds and grasses are small. To control bermudagrass, for example, the lowest rate is usually adequate. As the height and density of vegetation increases, the combination rate can be increased correspondingly. To thoroughly cover dense stands of tough weeds such as johnsongrass, the highest rate is required.

For more spray per acre, water and a suitable emulsifier can be added to the solution to reach the desired volume of spray mixture. Penetration and effectiveness are increased accordingly. Pramitol-oil-water emulsions at 400 gals. or more per acre are not unusual where extremely dense weed growth is to be harnessed.

Pramitol and Chlorates

This combination provides good top kill, followed by long-term residual control. It is usually applied as 5 gals. to 10 gals. of liquid herbicide with 125 lbs. to 150 lbs. of chlorate plus sodium metaborate and 200 gals. to 400 gals. of water per acre. Because the chlorates are high in solubility, they move rapidly into the root zone to work on deep-rooted established weeds. For the most part, herbicide remains near the soil surface to kill young weeds shortly after germination. Lower rates will generally control most annual weeds; higher rates are

Table 1. Tests Conducted at Texas A&M University on the Effectiveness of Pramitol 25E

Active Ingredient per Acre	Spray Volume per Acre	Time and Application	Weeds Controlled	Remarks
10 to 16 lbs. in water.	200 to 300 gals. with power gun.	Sept. 15 to April 15, to short weeds and soil.	Delayed control of most emerged annuals and some shallow-rooted perennials. Preemergence control of most seedlings after one or more 2-in rains.	Residual control of 18 to 30 months, except for emerged oxalis and dallisgrass and their seedlings, and most deep-rooted perennials.
10 to 16 lbs. in toxic oil.	150 to 200 gals. with power gun.	Anytime, but preferably when temp. is above 80°. Apply overall and to soils.	Foliage kill of all species. Top kill of most herbaceous species. Preemergence control of seedlings of most species after rainfall of 2 in.	Residual control of 18 to 30 months, except for invasion by oxalis and some emergence of dallisgrass.
30 to 40 lbs. in toxic oil.	150 to 200 gals. with power gun.	Anytime, to all vegetation and soils.	Foliage kill of all species. Top kill of most herbaceous species. Delayed eradication of johnsongrass and bermudagrass after several 2-in. rains.	Residual control of 18 to 30 months, with exceptions of emerged oxalis and dallisgrass, and seedlings of these species.

recommended where tough perennials predominate.

Combinations of Pramitol and hormone-type weed killers are practical where hard-to-kill broadleaf weeds are present with woody vegetation. These combinations work best when applied early in the growing season.

To control woody plants 2,4,5-T or silvex are recommended additives to Pramitol. Application rates will vary from one location to another, ranging from 5 gals. to 10 gals. of Pramitol combined with 2 lbs. to 4 lbs. acid equivalent of 2,4-D, 2,4,5-T, or silvex. Whichever combination is selected, it should be mixed with sufficient water to assure good coverage of foliage.

Addition of 2 lbs. to 4 lbs. of a hormone-type weed killer to a Pramitol-chlorate or Pramitol-oil combination will broaden the spectrum of weeds that can be controlled and hasten top kill.

Southern Weed Meet Sets Industrial Control Talks

A Report on Practical Organization of an Industrial Weed Control Division, by Irvin A. Berger, vice president, J. C. Ehrlich Chemical Co., Inc., Reading, Pa., will lead off industrial weed sessions at the Jan. 24-26 Southern Weed Conference. Scheduled for the Jung Hotel, New Orleans, La., the '67 meet also offers weed control sessions in such areas as agronomic crops including turf and pastures, horticultural crops, and brush and tree control.

Industrial talks will include "Diversification of Services—A Key to an Applicator's Success," by Tom Graham, president, Graham, Inc., Oklahoma City, Okla.; and "Satisfying Our Industrial Customers' Weed Control Needs," by Glen I. Bounds, industrial herbicide sales, Van Waters & Rogers, Inc., Dallas, Tex.

Vegetation control in asphalt pavements, drainage ditches, river banks, and rights-of-way for power lines, railroads, and highways will also be covered. A new brush killer, tree growth inhibitors, drift control agents, and helicopter application of pellets are to be evaluated for conferees by experts in the field. Eleventh-hour conference queries can be directed to Southern Weed Conference secretary-treasurer, Dr. H. Hanly Funderburk, Botany Department, Auburn University, Auburn, Ala.

Illini Host Jan. CA's School

University of Illinois will host an anticipated capacity crowd for its 19th Illinois Custom Spray Operators' Training School, Jan. 25-26, at the Illini Union. Activities really begin on the afternoon of Jan. 24, with an informal get-together and early registration for attending applicators.

Program includes a number of discussions on weed control in agronomic crops. Of special interest to noncrop controllers will be planned talks on Fungicides for Lawns and Ornamentals, Weed Control in Turf, and Industrial Weed Control. WTT readers can obtain more information on the course from H. B. Petty, Chairman, Custom Operators' Training School, College of Agriculture, University of Illinois, Urbana, Ill. 61801.

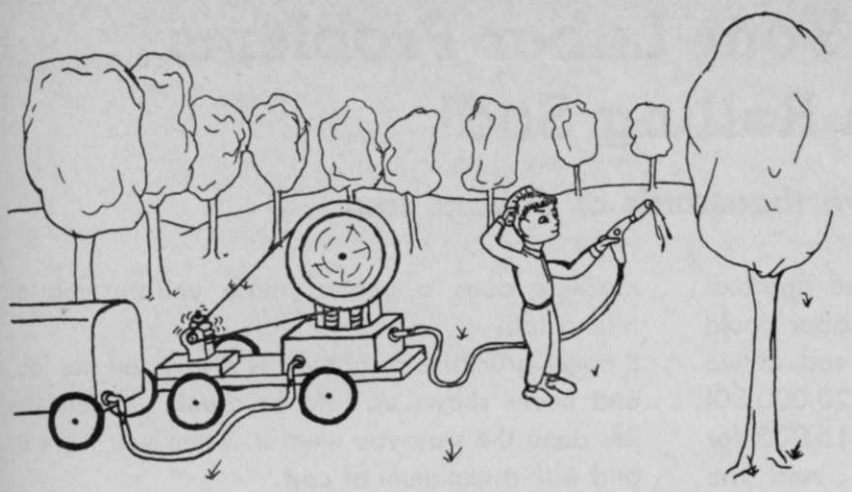
Calif. Weedmen To Gather In San Diego, Jan. 24-26

Final program arrangements are complete for this month's 19th Annual California Weed Conference at San Diego's Hilton Inn.

Following a welcoming address by conference president Cecil Pratt, Deputy Agricultural Commissioner, San Bernardino County, Calif., balance of the opening session will be devoted to cropland weed control. Second day's program is entirely focused on noncrop and aquatic weeds, with talks to include "Weed Control in Turf"; "Alligator and Skeleton Weed Control"; and "Application Methods for Aquatic Weed Control and Dissipation of Herbicides in Water."

Jan. 25 luncheon speaker, Stuart Turner, consulting agrologist, from San Francisco, will discuss "What's New in Pesticide Litigation." Research reports are due to be presented at the final morning session. For last-minute details, contact Floyd L. Holmes, Secretary, California Weed Conference, E. I. duPont de Nemours & Co., 118 Blueberry Hill, Los Gatos, Calif.

New officers and directors of the Missouri Valley Turfgrass Association chosen in conjunction with the recent Lawn and Turfgrass Conference at the University of Missouri, pictured here at their first meeting following the election, are (from left front): secretary-treasurer Earl M. Page, Earl M. Page, Inc., St. Louis; president William M. Latta, manager, Princeton Turf Farms, Kansas City; first vice president and retiring president, Robert V. Mitchell, Sunset Country Club, St. Louis; and second vice president, Walter W. Fuchs, Upjohn Co., Glen Ellyn, Ill. Standing are director Donald Clemans, Norwood Hills Country Club, St. Louis; group advisor and consultant, Dr. Delbert Hemphill, professor of horticulture, University of Missouri, Columbia; and director Stan Frederiksen, Mallinckrodt Chemical Works, St. Louis. Not pictured is director Robert Bechtold, Bechtold Lawn Service, Columbia.



Match Engine Power To Pump Requirements

A power source capable of driving a pump at the volume and pressure for which it was designed is a necessity. When you buy an engine-pump system, manufacturers supply engines with enough power to drive the pump at its maximum output.

Unfortunately, it sometimes becomes necessary to replace an engine or pump. If engine output is not matched to pump requirements, the mismatch may become a troublesome and expensive venture.

Pounds per square inch (p.s.i.) and gallons per minute (g.p.m.) can be measured by gauges on almost every modern pump. These two items may be used to calculate how much power will be needed to drive a specific pump. Maximum p.s.i. and g.p.m. are found also on pump specification sheets.

The following formula may be used to calculate the *minimum* horsepower needed to operate a pump adequately.

$$\text{Horsepower} = \frac{\text{(p.s.i.) x (g.p.m.)}}{\text{1730 x (pump efficiency, 80\%)}}$$

To determine the horsepower needed to drive a pump designed to deliver 10 gals. per minute at 400 lbs. per square in., first multiply g.p.m. (10) by p.s.i. (400). This gives 4,000. Next multiply 80% pump efficiency (0.8) by the constant 1730 to get the divisor 1,384. Now the formula is stated:

$$\text{Horsepower} = \frac{4{,}000}{1{,}384}$$

Divide 4,000 by 1,384 and you'll find that 2.89 hp. is needed to drive a pump, 80% efficient, to produce 10 g.p.m. at 400 p.s.i. This horsepower value is the minimum needed for a pump that is 80% efficient.

Like many other machines, pumps are not 100% efficient. If they are well maintained, however, 80% effectiveness will remain relatively constant.

Crownvetch Versatility, Maintenance Ease Told

Crownvetch, a landscape material for beautification, erosion control, or weed control, is most effectively planted in existing soil conditions according to Fred Grau, Grasslyn, Inc., president. Grasslyn markets seed for the groundcover plant.

Grau explains that special slope preparation by applying layers of topsoil should be avoided because the plant roots will concentrate in the topsoil layer; heavy rainfall can then make the layer slide. As crownvetch is not usually mowed, slopes may be left in rough condition, with any rocks, logs, branches, or other debris left in place. Further erosion control will be achieved if seeding is done horizontally across the slopes.

Early spring planting in northern states, and fall or early winter planting in the Deep South, is suggested. And for rapid soil root-binding, the company notes that companion grasses should be seeded with crownvetch. In northern climates, Kentucky 31 fescue at 30-40 lbs. per acre, with 20 lbs. of crownvetch seed can be used. Domestic-grown creeping red fescue or perennial ryegrass may also be used. Kentucky 31 fescue or weeping lovegrass may be used in the South with the cover crop. Lovegrass seed should be held to 3 to 5 lbs./A.

Maximum protection is afforded by the plant when it is allowed to develop without mowing. But where it must be mowed, the company suggests a delay until seed pods are brown. Then it should be cut at 5-inch height with a flail or rotary mower.

Ureaform, a slow-release, insoluble, nonburning long-lasting type of nitrogen fertilizer, is highly beneficial to establishment of crownvetch, Grau points out. Suggested specifications for application are 440 lbs. per acre of granular ureaform.

Additional information on crownvetch can be obtained by writing to Grasslyn, Inc., Box 177, College Park, Md. 20740.

Eliminate Your Labor Problems In Rolling Sod!

(and save thousands of dollars, too)

The machine pictured below has rolled approximately 6,000,000 yards of sod! If labor could have been found to hand roll this much sod, at two cents per yard it would have cost $120,000.00! The actual cost was approximately $15,000 for a savings of about $105,000.00. And the machine does a neater, more uniform job of rolling too!

It never grumbles or growls, is always on the job, and never shows up late or drunk. It gets the job done the *way you want it, when you want it,* and *with a minimum of cost.*

If you cut over 30 acres of sod per year, *it will pay you to buy this roller*

The Daymon Sod Roller

Patent Pending

The Daymon Sod Roller will roll from 1200 to 1500 yards per hour under average conditions—up to 2000 yards per hour under good conditions! It will roll 16 inch, 18 inch, or 24 inch sod in either one yard or one and a half yard rolls. It can be quickly adjusted for varying thicknesses, soil and sod conditions. *It always works!*

Daymon manufacturing Corp.

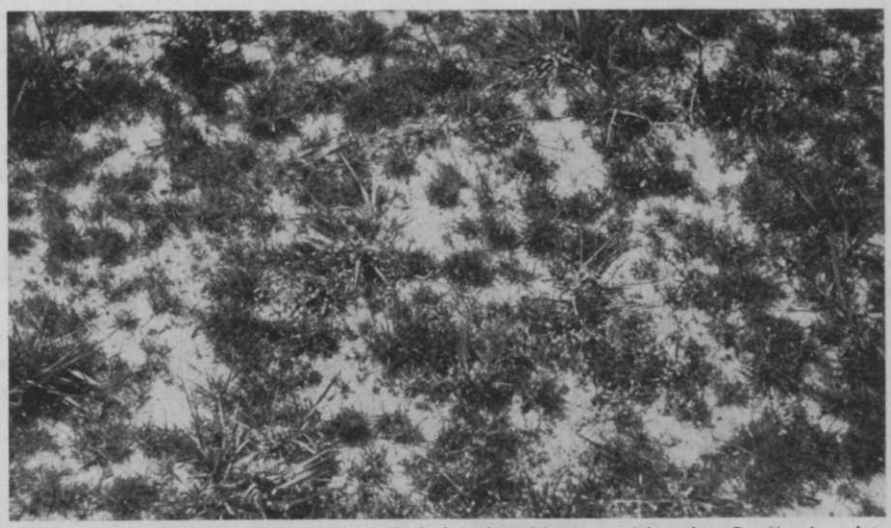
7450 Weller Road **Gregory, Michigan 48137**

Phone: Fowlerville, Michigan—Area 517-223-9966

DEVELOPED BY SOD MEN FOR SOD GROWERS

Herbicides for Sod Field Weed Control

By
DR. JOHN A. MEADE
Extension Specialist—Weed Control
Rutgers University
New Brunswick, New Jersey



Open areas in newly seeded turf are particularly vulnerable to weed invasion, Dr. Meade points out. Bare spots caused by poor management are another invitation to weeds.

The sod producer is in what is probably the best possible position to make full use of herbicides. He is growing a single crop, has no ornamental plantings or trees to worry about, and has large enough areas to make use of herbicides economically.

The first thing the sod grower must do, of course, is decide whether he in fact has a weed problem or has the trouble spots which lead to weed infestation.

It's worth noting in passing that a good many people make their own weed problems. Any open spot in the turf caused by poor management—scalping by mowers, dead turf due to fertilizer burn, or compaction caused by improper equipment—will be filled in by weeds.

The grower who has the time and persistence to use and make his help use proper management will need herbicides only for isolated problems or areas of severe weed infestations.

Now then, let's assume that through no fault of his own the grower has a weed problem. What should he use? (We're also assuming this is mostly bluegrass turf. Check company or local authorities for specialty turf.)

Controls Available For Annual Grasses

First and foremost among annual grasses is crabgrass and fortunately there has been tremendous activity in this field with several compounds available. Next most troublesome species is goosegrass, but since this is normally a pest in areas of heavy traffic and compacted soil, it doesn't trouble the sod producer too much.

Foxtail (green, yellow and giant) as well as barnyardgrass and the panicums are other annual grasses which show up in turf seedings made on land previously in farms. Annual bluegrass (*Poa annua*) is a special case since it germinates in the fall and early spring. Herbicides for its control must be applied in early fall.

Recommended herbicides for controlling annual grasses are shown in Table 1.

Table 1. Recommended Herbicides for Control of Annual Grasses

At Time of Seeding:	
Bandane	Has given good results in some tests but control is questionable.
Tupersan (Siduron)	Good control of weedy grasses. No injury to germinating bluegrass. Will need watering in with ½ in. of water. Residual activity is short, so retreatment may be necessary.
Preemergence to Weedy Grasses:	
DCPA (Dacthal)	Still a good herbicide, and economical.
DMPA (Zytron)	Excellent. A little broader spectrum of control. (Recent information indicates Zytron will not be manufactured in 1967).
Benefin (Balan)	A good herbicide.
H-9573 (Azak)	Very good for grass control. May injure bents and fineleaf fescues.
Bensulide (Betasan, Pre-san)	Very good for controlling grasses. Must be watered in. Area cannot be reseeded for one year.
Postemergence:	
DSMA or related Compounds	Be sure they are arsonates, not arsenites or arsenates.

Selective Herbicides for Perennial Grasses Lacking

We are weak in selective herbicides for controlling perennial grasses. Use of temporary soil sterilants prior to seeding is effective but expensive. A spot treatment of amitrol or dalapon is probably the best approach to most perennial grasses, especially the bunch type. These two are translocated chemicals and should be applied to the foliage. Kerosene, cacodylic acid or paraquat also will knock down the foliage but generally the grass will come back.

The rhizomatous grasses which