

How Chlorea Herbicides Work

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CONTRACT applicators are in a "front line" position to handle many of the noxious weed problems which are encountered in industry today. Many companies have available a broad line of weed killers for practically every type of weed problem and CAs must choose the product most suited to the particular application.

Broadly speaking, chemical weed control can be divided into five distinct types:

1. *Soil sterilization* — elimination of all vegetation, or total weed control.
2. *Weed and brush control* — where there is no need to worry about damage to nearby desirable plants.
3. *Weed and brush control* — where *special care* has to be exercised so that desirable plants are not injured.
4. *Turf and lawn weed control*.
5. *Weed and algae control in lakes and ponds*.

Each of these areas requires its own specific type of weed control chemical and its own special method of use. The following information deals with soil sterilization, or elimination of all vegetation.

Chlorea herbicides fall within the class of chemical weed killers known variously as soil sterilants, nonselective herbicides, or total weed killers. Where applied to the soil, these total weed killers generally render it unfit for plant growth for varying lengths of time. The length of time they persist in the soil and prevent regrowth depends on the particular chemicals used and the amount lost through oxidation, leaching, and microbial breakdown. These losses



One suggested application for Chlorea herbicides is for control of weeds around tank farms and pipe lines. This installation, including the pipeline path in the foreground, was successfully treated with Chlorea, with less fire hazard and easier accessibility as direct results.

are largely dependent on the amount of chemical applied, soil type, rainfall, and to some extent, temperature. The degree of persistence has immense practical importance as we shall see later.

Common Weed Control Jobs

Before discussing these Chlorea formulations and how they fit into this picture, let us first review some of the weed situations that CAs are likely to be called on to handle. Generally speaking, whenever vegetation is unsightly, creates a nuisance or fire hazard, or harbors pests, it should be removed. Below are listed typical locations where weed problems exist:

Private homes and areas — weeds in driveways, tennis courts, courtyards, stable yards, patios; around buildings and school playgrounds; along fence lines; also around motels and camps.

Industrial areas — weeds in areas around warehouses, storage tanks, fence lines, ammunition dumps, pipelines, power lines, electrical installations, ditch banks, railroad and streetcar yards, freight yards and sidings.

Municipal and county installations — weeds in parking areas;

around road signs, guard rails, lane dividers, bridge abutments, airfields, airports, airstrip lights, fences, fire breaks, tennis courts, road maintenance equipment depots, drive-in theaters, parks.

This is quite a formidable list of weed control opportunities which offers worthwhile opportunity to expand business.

To tackle any of these weed problems intelligently, some knowledge of weeds is required. Unwelcome plants can be divided into the broad categories shown in Table 1.

A further division, which includes both of the categories shown in the table, is shallow-rooted and deep-rooted growth. Obviously, deep-rooted perennials, such as dock, quack grass, thistle, or bindweed, are much harder to kill than, for example, the shallow-rooted annual crabgrass or plantain. Different chemicals are required for each type. Easiest weeds to kill are the shallow-rooted annuals, and if the right chemical is put on *before* these plants germinate in spring, complete control of such weeds for an entire season can usually be obtained.

Hardest weeds to kill are gener-

Table 1. General Classification of Weeds

Grassy Weeds:	Broadleaved Weeds:
Such as quack grass, crab grass, and orchard grass; these may be either annuals or perennials.	Like dandelions, plantains, chickweed, docks and thistles. These, too, may be annuals or perennials.

ally the deep-rooted perennials. Top kill alone will not usually destroy the rest of the plant, as it will almost always resprout. For deep-rooted weeds, a special chemical is required — one that is soluble in soil moisture and will "leach" down through the soil into the root zone, where it is absorbed by the roots. Chemicals that are absorbed by the leaves and translocated into the roots may also achieve total kill.

Complete nonselective weed control thus requires a weed killer which can handle all the different types of weeds in a particular situation. No *one* chemical can do this efficiently and economically. Some chemicals are selective for grass and will not harm broad-leaved weeds; others are active in the reverse direction; still others are too insoluble and are therefore no use for weeds with deep roots. Therefore, what is needed is a product which is a *combination* of chemicals. The Chlorea line of weed killers is among those developed to give broad spectrum weed control.

Chemical Analysis of Chlorea

Chlorea is a combination of three weed killers — sodium chlorate, sodium metaborate, and monuron. These chemicals are recognized weed killers by themselves, but in combinations they have unique characteristics of vegetation control at different root levels in the soil.

Sodium chlorate functions variously in *Chlorea*. First, it is a strong oxidizing agent and kills all foliage by contact. To do this it penetrates the leaves, even within the living cells. Here it upsets the metabolic processes to such an extent that they can no longer function properly and the cells and leaves collapse and die. If the sodium chlorate does not destroy all the top growth immediately, it may also be translocated to other parts of the plant, even downward into the roots and other underground parts, where it again exerts its toxic action. Second, the sodium chlorate is very soluble in ground moisture, and consequently penetrates soil deeply, coming into contact with and killing the roots of the weeds. Third, sodium chlorate, because of its oxidizing action, helps to prevent too rapid

a breakdown of the monuron by soil microorganisms, thus prolonging the latter chemical's action.

Sodium metaborate has two special functions in *Chlorea*. First, it acts as a very efficient damper on sodium chlorate which otherwise might increase the flammability of treated organic matter. In other words, sodium metaborate is used as fire suppressant material. Second, the sodium metaborate is itself highly toxic to plants through their roots. It leaches more slowly than sodium chlorate, acts slower, and thus helps give a more prolonged effect.

Monuron, the third chemical in *Chlorea*, is almost insoluble in ground moisture, so it tends to stay in the top inch or so of soil. Here it prevents weed seeds from germinating and growing into established plants, as well as exerting direct toxic action on weeds that have their roots in this top zone.

Fourfold Action of Chlorea

Thus, the actions of *Chlorea* are fourfold because of the three very

seldom, if ever, see the light of day. Thus, the top layer of soil is rendered very inhospitable for a considerable time as far as most weeds and seedlings are concerned.

How long will the soil stay sterile? This depends on how much *Chlorea* is applied and amount of rainfall following application. As a rule, one application at recommended rates will prevent reinfestation for at least one full season under average rainfall conditions. Usually, reinfestation starts with a particular species, and as the chemicals leach out of the soil or are otherwise lost, more and more species begin to flourish. It may take several years or longer for reinfestation to become equal to the original state. A well-informed operator will not permit this to happen, but will re-treat at one-half rates every other year or as necessary.

Formulations Offered

There are three *Chlorea* formulations available: *Chlorea* 125; *Chlorea* 3; and *Chlorea* Granular.

Chlorea 125 and *Chlorea* 3 are



Utility stations, such as this electrical complex, are good targets for weed elimination with *Chlorea* herbicides, this article reveals. Improved visibility, accessibility, and freedom from fire hazards are the benefits bestowed by professional weed control services.

active and very different constituents. They —

- 1) Kill off top growth.
- 2) Kill deep-rooted perennials and prevent resprouting.
- 3) Kill shallow-rooted plants.
- 4) Prevent weed seeds from establishing themselves.

What happens to weed seeds in the soil? Generally speaking, seeds are not affected directly by the chemicals in *Chlorea*. As soon as seeds start to germinate, however, and absorb some of the soil moisture containing the chemicals, the seeds succumb and "weedlings"

in powder form and both may be applied dry or as a water-mixed spray. *Chlorea* 3 contains more than twice as much monuron as *Chlorea* 125, and, consequently, lasts longer in preventing reinfestation. Recommended application rates vary from 1 to 3 pounds per 100 square feet, with half rates for follow-up treatments in following years. *Chlorea* Granular consists of small granules or pellets which are easy to apply by hand or in mechanical spreaders de-

(Continued on page W-11)

Hyacinth Control Commission, of which Dryden is commissioner.

Secretary-treasurer for the coming year is Herbert Friedman, president of Southern Mill Creek Products Co., Inc., Tampa. This is Friedman's second term in the post.

Directors installed were A. S. Chipley, Lee County Hyacinth Control Commission; Jack Salmela, Brevard County Mosquito Control Director; Dan Gorman, Hillsboro County Mosquito Control Director; and Mel Williams, Sarasota County Mosquito Control Director.

Friedman told *Weeds and Turf* that next year's meeting will probably be held in Tampa, but exact time and place will be announced later.

Chlorea Herbicides

(from page W-5)

signed to apply granular materials. Usual rates of application are 1 to 2 pounds per 100 square feet. One-half pound per 100 square feet is frequently all that is required for annual follow-up treatments.

Safety to Man and Animals

The individual chemicals in Chlorea products are generally regarded as having rather low toxicities to man and animals. It may be fairly concluded, therefore, that the Chlorea herbicides can be considered generally nonhazardous to mammals under normal conditions of use. It is, nevertheless, advisable not to leave containers or chemicals where children or animals may have access to them.

Precautions

Avoid applications in periods of hot, dry weather, because killing action of Chlorea herbicides is generally through the roots and is dependent on soil moisture. The Chlorea sprays, however, will burn off the tops of weeds at any time and will be effective on the roots as soon as rain falls. Be careful not to apply on or near valuable trees, shrubs or other ornamentals, or to areas into which these roots may extend. Also, do not use on slopes where runoff will move the chemical into the root zone of turf or desirable plants and trees. Remember that all three products should be used only where unproductive soil is not an objection.

Book Review

Diseases of Turfgrasses

by Dr. Houston B. Couch, Rheinhold Book Division, New York, N. Y., 1962, 304 pps. \$10.00.

Extensive appendices and thorough classification tables are among the best features of this new textbook designed to help CAs, and turfmen in general, with the complex problems of disease control.

Nearly 100 pages are given over to analysis of turfgrass disease chemicals, and grasses susceptible to ailments. Arranged both by common and technical names, these tables provide a handy guide which could be used by technical directors and servicemen alike.

Couch's new text is more than a handbook, however. In the first 178 pages, the distinguished author delves insistently into the rudiments of both fungus and nematode-incited diseases, and gives valuable pointers on how to tell one disease from another.

A section on the fundamentals of disease control is a welcome facet of author Couch's comprehensive reference work. This indispensable background material is designed to aid the newcomer to turfgrass disease control, and at the same time is a convenient

reminder for the experienced professional.

Another highlight of the volume are the illustrations, both full color and black-and-white, which give vivid reinforcement to the details set forth in the text.

Couch, who is an associate professor of plant pathology at Pennsylvania State University, has given the contract turf spraying field a valuable tool in his new book. While not an inexpensive publication, serious students of the field will find this reference an important buildingblock to further understanding of turfgrass diseases and how to control them.

300 Expected at Midwest Turf Day

Nearly 300 delegates are expected to attend this year's annual Midwest Turf Field Days scheduled for September 10 and 11 on the campus of Purdue University, Lafayette, Ind.

Made up of applicators, supplier staff technicians, government and university researchers and others, the group will spend most of the day in outside examination of Purdue research work.

More information is available from Dr. William Daniel, group secretary, at Purdue.

Literature you'll want . . .

Here are the latest government, university and industrial publications of interest to contract applicators. Some can be obtained free of charge, while others are nominally priced. When ordering, include title and catalog number, if any. Sources follow booklet titles.

Sprayers for Weed Control Chemicals. Agronomy Dept. Mimeo No. 60. 4 pp. University of Maryland Extension Service, College Park.

Aquatic Weed Control. Circular 219. 16 pp. il. 1962. Agricultural Extension Service, University of Florida, Gainesville.

Weed Control in Western Irrigation and Drainage Systems. Agricultural Research Service and Bureau of Reclamation Joint Report No. 34-14. 24 p. 1960. U.S. Department of Agriculture, Washington 25, D. C.

Lawn Diseases in the Midwest. North Central Regional Extension Publication No. 12. 16 p. il. 1961. University of Nebraska Extension Service, Lincoln.

Use of Low Volume Sprayers for Applying Atrazine 80W and Simazine 80W. Bulletin GAC 630. folder. il. Geigy Agricultural Chemicals, P. O. Box 430, Yonkers, N.Y.

Weeding with Chemicals: 1962 Guide. Bulletin ID-1. 20 pp. Purdue University Agricultural Extension Service, Lafayette, Ind.

Potassium Cyanate Controls Crabgrass and Chickweed. Bulletin F-255. 8 pp. il. American Cyanamid Company, Agricultural Division, Princeton, N.J.

Johnson Grass Control. Agronomy Dept. Mimeo No. 16. 2 pp. University of Maryland Extension Service, College Park.

Poison Ivy, Oak, and Sumac: Identification and Control. Ext. Folder No. 144. 6 pp. il. North Carolina Agricultural Extension Service, Raleigh.

What the Experts Say about Crabgrass Control. 24 p. il. Agricultural Chemicals Div., Diamond Alkali Co., 400 Union Commerce Bldg., Cleveland, O.

Turfgrass Diseases. Circular 207-A. 1960. 16 pp. Colorado State University Extension Service, Ft. Collins.

Control of Cattails in Ponds. Leaflet 229. 4 p. University of Kentucky Extension Service, Lexington.