Eradication

California Waterways

Analysis And Control

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THE CONTROL of alligatorweed has proven to be quite a complex operation. Even with several years of successful control and eradication in Tulare County and more recently in Los Angeles county, we cannot hope to let down our guard against this formidable aquatic weed.

The actual methods of control are becoming more sophisticated as our knowledge about the effectiveness of various environmental protection chemicals increases.

When the urgency of needed action was determined in 1966, the California department of agriculture and the Tulare county agricultural commissioner's office launched a concentrated offensive to eradicate the weed. With an Eradication Agreement formulated, our job was to conduct field trials and find a solution to the problem. Public and private awareness of the problem was in our favor. In short order, everyone concerned with alligatorweed was soon helping in test plots, contributing time and talent, making access roads, shifting water schedules and anything else needed to further enhance testing. All told, local, district, state, Federal, private and public individuals, organizations and corporations joined in the program.

To date over 350 field test plots with various chemicals and combinations thereof have been tested. Almost every chemical and method of control have been tried.

Foremost in our minds was the need for materials that would be safe in the water and safe to apply. It should be pointed out that tests conducted in Tulare and Los Angeles counties were made taking into account all environmental relationships. The fish and game commission as well as the bureau of chemistry for the State of California were deeply involved in securing the label deviation and subsequent registration on the product use. Additionally, our present method of control has been approved by the state. This does not mean that the product use may be adopted by other states without first checking with that state's officials.

Our initial thinking was that environmental protection chemicals would play a major role in the eradication program. Those with longer residual activity should be likely candidates. However, this was not necessarily the case.

The bare ground materials were all investigated with sodium-chlorate at 1200 pounds per acre showing the best results. Karmex diuron at over 100 pounds per acre

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This is what many of the ditches in Tulare County looked like before treatment. Note bottom is completely covered with an alligatorweed mat. Water movement is all but stopped.

After treatment with Vapam and oil the same ditch now is highly visible. No alligatorweeds are actively growing. An eradication program can be an effective tool in keeping unwanted vegetation under control.

This is alligatorweed, one of the toughest aquatic weeds to control in existence. Note hollow stem, small flower, opposite leaves, nodes and root. This weed easily finds a home almost anywhere.

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resulted in chlorosis or a yellowing of the alligatorweed foliage. In tests in Los Angeles county, soil active materials such as the substituted ureas and the uracils were ineffective due to the extremely sandy soil and the huge volumes of water covering much of the area several times during the year.

Generally we found that we could eliminate the aerial portions of the plant with applications of contact herbicides. Silvex also performed well in burning back vegetative growth, however it and other phenoxy herbicides are not highly effective on root kill.

Most translocative materials were tried. Amitrole and dicamba looked fair. Studies by USDA and others indicate that whereas translocated herbicides move freely in the main part of the alligatorweed transport stream, they do not translocate from the main stream of the system to the buds at each node, or to any other inactive growth tissue.

Growth regulators and fertilizers were looked into. Fumigants were encouraging. Tarping with black polyethylene for 92 days, where temperatures under the tarp reached 190 degrees, only produced chlorotic whitening with recovery after removal of the plastic. Methyl bromide under tarps worked well where there was no water in the root zones. But carbon bisulfide injections proved too hazardous (flamability) and like methyl bromide proved too time consuming and ineffective on large scale operations.

Many adjuvants were tried in combinations and singly.

Los Angeles county tests produced different results than those in Tulare County. Test pilots administered by the University of California in 1963 showed Tordon 22K picloram weed killer to be ideal for the task. Away from water, product effectiveness and economy made it hard to surpass. It was ruled out in 1968, however, for lack of registration and possible hazards due to the nature of the infested area.

Likewise, a combination of Amitrole and Silvex looked promising. It controlled alligatorweed located away from the water, but was less effective on plants growing near the water's edge.

The Tulare County test program was slightly more advanced than the Los Angeles County program. Thus, we concluded, after a thorough analysis of the test data, that a combination of VPM or Vapam soil fumigant and paraquat applied as a foliar drench was the most effective method of control. Application rates were one quart Vapam, one pint paraquat and eight ounces surfactant in 25 gallons of water per 100 square feet. This combination showed excellent results within a very short period of time. The Vapam affected the root zone and the paraquat controlled foliar growth.

In November 1967, county, state and irrigation district spray crews began treatment in ditches near Porterville and Visalia. Private applicators were contracted to treat (under project supervision) other areas.

Applications were made with the same degree of precision demonstrated in the test plots. Areas were staked off into 100 square feet plots and rigs were calibrated to spend five minutes per plot. In heavily infested areas, where the mat of foliage measured nearly two feet deep, penetration was slow and difficult. This prevented, in some cases, complete contact with all foliar portions of the plant. Usually new plants formed from the nodes of

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these untreated alligatorweeds. However, burning the top growth a few days after treatment reduced regrowth tremendously by destroying the nodes previously not harmed. Overall results were unbelievably successful.

Incidental to our tests we found that frost damages all foliar portions of alligatorweed except the nodes. We have applied Vapam and paraquat at temperatures ranging from 30 degrees to 90 degrees. Optimism results for us are achieved when applications are made in temperature from 65 degrees to 75 degrees.

In 1968 we perfected the use of high emulsion type weed oil as a substitute for paraquat. This resulted in even greater penetration of foliage and a substantial reduction in use cost. The rate used was one gallon weed oil, one quart Vapam, two ounces surfacant in 25 gallons water applied on 100 square feet.

The Vapam-oil spray plus burning gives control nearing 95 percent. The regrowth is retreated by spraying and in areas where penetration is difficult (steep banks and soil types) "pot holing" is employed. This is done by digging a basin, or loosening the soil around individual plants and filling with spray mixture. In some areas five pounds per acre of diuron is added to the mix to control annual weeds, making it easier to find any regrowth.

Amitrole has also been used in the summer months to weaken or stress the alligatorweed plants for winter pot hole control measures.

Our alligatorweed program in both Tulare and Los Angeles counties is now in the search and destroy phase. To prevent small unseen infestations we found it necessary to establish a clean ditch program. Consequently we have now concentrated more effort in this area. Common annual weed species are best controlled with diuron (Karmex) or simazine (Princep) at 10 pounds per acre, and in areas where feasible, bromacil (Hyvar X) at 5 pounds per acre. Where Johnsongrass is established, we have used MSMA and Dowpon C.

Probably the most difficult weed to control for us is smartweed. It grows rapidly and can completely hide any small alligatorweed in short order. Where no susceptible crops are present we use 2,4-D amine. Ammate X is substituted in areas bordered by crops.

The combination aquatic and ditch bank weed control program is paying off. Only a few widely scattered alligatorweed plants are in evidence today. Those that are found are treated with dicamba at the rate of one ounce to five gallons water. Only 30 single small plants were found this past fall in Tulare County and all of these have been treated.

It should be pointed out that other means of weed control have been utilized in addition to chemicals. When it could be done, burning of trash weeds helped remove old growth. An L.P. gas burner boom, mounted on a 4-wheel drive vehicle was a big help.

Physical removal of spot infestations with a backhoe completely eliminated the problem. Weeds and soil removed in this method were hauled to a black-topped apron where they were spread out and treated with Vapam. The entire area was treated with Vapam and refilled with clean soil.

In some waterways we completely reshaped the system, moving the infestation up to the bank where it could be spread out and treated. Removal of willows, dead trees and bamboo, plus the building of a roadway, enhanced the flood control and water movement and made alligatorweed control more successful.

In Los Angeles County, helicopters equipped with Amchem's microfoil boom have been used over much of the infested area. While application costs are high with this type equipment, we have been able to apply Silvex at rates of 2-, 4-, and 8-pounds (active ingredient) per acre with a high degree of success.

Additionally, biological control methods, in the form of the flea beetle, have been introduced on alligatorweed. Early releases failed to establish. Later the beetle successfully colonized along a half-mile of a river in Los Angeles County, but did spread far from the water. Heavy flooding in 1969 flushed out all the beetles and the project was abandoned.

Finally, the awareness of individuals to the alligatorweed problem has been most rewarding. Cooperation by land owners in doing whatever needed to be done and continued surveillance by all has made this project a success. The status of alligatorweed can now be changed from a problem to a nuisance. □