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SPECIAL
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THE CONTROL OF JOHNSON GRASS

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Johnson grass is a menace on thousands of acres of some of the most productive land in Virginia. It is particularly serious in river and creek bottoms in many counties over much of the state.

Control methods have been worked out for eradicating Johnson grass on land not subject to overflow, but little work has been done in Virginia. It seems, however, that control measures worked out and adapted herein are worthy of trial in this state even though the soils and weather conditions are somewhat different. Several Virginia farmers have used these suggestions with some variation and have had good results. The killing effects of TCA and sodium chlorate on Johnson grass have been good, but slightly higher or lower rates may be needed in this state.

Eradication versus Control

On fields not subject to overflow, eradication is simple enough and worth attempting. At least for the present, it appears that control of Johnson grass is all that can be achieved on the overflowed lands, although there are examples of eradication on bottom land. Control means the farmer will learn to live with the problem and be able to produce crops successfully without too much expense and without letting the grass spread to new fields. Eventually eradication may be attained on control farms.

How Johnson Grass Grows

Johnson grass is spread by seed, which may be brought in with low-grade crop seeds, carried by floods, carried in hay or fodder, or be self-sown. It is not known how long the seed will remain viable in the soil.

Johnson grass is a perennial, producing heavy vigorous rootstocks or "roots" which make most of their growth after July 1 and after the plant is in bloom. If the field is kept mowed, these rootstocks are much less vigorous - so much so that Johnson grass as a crop (it is a good hay and pasture crop) must not be overcut or overgrazed. It is not as easily injured in this way as alfalfa but responds similarly.

This dependence of Johnson grass on vigorous rootstocks is the most significant point in its control. Chemical methods should take rootstock development into consideration. Johnson grass should never be allowed to grow uncontrolled. This permits seed production and increases root reserves. There is evidence that the disturbance of the rootstocks and the reduction of total stand involved in preparing land for corn permits later vigorous development of individual plants, so that some of the most vigorous Johnson grass is found in corn fields. Pure stands of Johnson grass, after a year's growth become "sodbound", grow shorter and yield less when grown for hay. As in other "sodbound" situations, lack of nitrogen causes this reduced growth.

Steps in Control

Cultural control - Excellent control has been obtained in Virginia by using these suggestions:

1. Weaken Johnson grass by repeating clipping or grazing until about July 1.

2. Plow the land and clean fallow it until time to sow small grains. The land should be worked every time the grass appears. A disc harrow is a good implement to use. If much growth is permitted during the summer period, poor results will be obtained. Clean fallow - Clean fallow - Clean fallow.
3. Seed to early oats, barley, or rye at the recommended seeding date in your locality. Sow and fertilize the grain well to provide competition for the grass. Wheat has been used but in some seasons Johnson grass may go to seed or interfere with combining. Other small grains come off the land earlier and seed formation is prevented and, consequently, more rootstocks are prevented from forming since heading and root development progress at the same time.
4. Plow cover crop under and fit the land for corn or combine grain and sow soybeans in rows.
5. Spot spray the very small patches that remain with TCA or sodium chlorate. Do not let seed heads form.

If summer fallowing was not well done the previous summer, it may be necessary to omit steps 4 and 5 and clean fallow the land again; then take up steps 4 and 5. Many variations are possible, depending on the crop in the field, but the essential items are close pasturing or mowing until July or August and working the land thereafter until seeding time in the fall. Two years of the above treatment should eradicate Johnson grass but you should watch for seedlings for several seasons.

Chemical control - If you want to try chemical treatment for control, the following plan is suggested:

1. Weaken Johnson grass by repeated clipping or grazing or any treatment that prevents the storage of reserve foods in the rootstocks. Do not let any seed heads form.
2. Apply 50 pounds of TCA or 100 pounds of sodium chlorate to the acre in August or September. Such treatment will control and almost eradicate Johnson grass. These rates may have to be altered with more experience in this state, but they have worked elsewhere.
3. Winter fallow and plant to corn the next spring. Soybeans might possibly be injured from the chemicals remaining in the soil. Avoid this crop.
4. Spot spray any Johnson grass plants that occur in the corn with TCA, or apply dry chlorate -- a small handful is enough. Thoroughly wet all Johnson grass with the TCA solution prepared below.

These herbicides seem more certain to kill Johnson grass than repeated summer cultivations but more observations are needed. Late summer and early fall applications appear superior to spring treatments because if it is applied in the spring the soil is usually sterilized so long that it cannot be planted to corn that season. Soybeans are sensitive to TCA and probably could not be grown successfully either. When herbicides are applied in the summer on open readily-drained soils, there should be no residual effects by the next spring. Late summer treatments dispose of seedlings, while seedlings can re-establish the

infestation after early spring treatments.

Neither chemical is appreciably poisonous at dosages suggested. Stock have been pastured on TCA-sprayed pastures without injury — they refuse to eat TCA-sprayed vegetation. Difficulty has been reported with chlorate on pastures where stock have been well salted since stock will eat chlorate or treated vegetation for salt. However, millions of pounds of chlorate are used in weed control every year without poisoning difficulties. It is non-poisonous unless large amounts are ingested, or unless the chemical is applied at high dosages and no salt is present for the livestock. To be entirely safe, however, livestock should be kept off sprayed areas until after it rains.

Applying TCA and Chlorate

TCA (sodium or ammonium salts) is readily applied in a solution of 1 to 2 pounds per gallon of water in a knapsack or compressed air sprayer. Stronger solutions can be made up but are likely to lead to nozzle clogging. To prevent clogging of small spray nozzles, strain water and spray solution through a piece of cloth. Sprayers made to apply 2,4-D may be used to spray an acreage by getting nozzle tips that will put out 25 to 50 gallons of water per acre.

Chlorate may be applied as spray, but it is not desirable to use more than $\frac{1}{2}$ pounds of chlorate per gallon of water. One pound per gallon is standard. Chlorate may conveniently be applied dry and is much less of a fire hazard in this way. When spot spraying, thoroughly wet the plants with one of the above sprays.

Which Herbicide To Use

TCA and sodium chlorate are both good. In favor of TCA it is not a fire hazard; it is more soluble in water and thus more easily applied by spraying. It is also effective at lower doses. TCA is irritating to the skin. There is considerable evidence that TCA decomposes in the soil faster than chlorate and does not sterilize the soil as long. It is highly corrosive to equipment and must be thoroughly cleaned out of sprayers before putting them away. TCA takes up moisture from the air and so cannot be satisfactorily applied dry.

In favor of chlorate — it is cheaper than TCA at present prices, is not as irritating to the skin as TCA, is less corrosive of equipment, and can much more readily be applied dry.

Chlorate presents a fire hazard. Like gasoline, it can be used safely. Some states have had no losses in nearly 25 years of using chlorate, but many others have had fires, personal injuries, even death, from chlorate during that time. It is a valuable tool; but, if you use it, follow the precautions given.

There are commercial mixtures of sodium chlorate with other chemicals which reduce the fire hazard. Generally, these mixtures are more expensive than chlorate alone.

Precautions in Using Chlorate

The fire hazard in the use of sodium chlorate is serious but readily avoided

by proper precautions. The basic fact is this: Sodium chlorate itself does not burn, but it makes inflammable material with which it is intimately mixed burn faster, even to the point of explosion. The fire hazard is less in dry applications than in spray applications, and less with mixtures than with straight chlorate.

1. Buy sodium chlorate in the manufacturer's original drum, and store it in this or some other tight metal container in a detached out-building. Take special precaution to see that it is not mixed with sulfur in any form since this mixture is dangerously explosive.
2. Wear rubber boots when spraying. Chlorate ruins leather, and crippling accidents have occurred when a chlorate-soaked shoe touched a tractor exhaust, or even took fire spontaneously.
3. Make up solutions outdoors on the ground away from combustible materials.
4. Do not spill the dry salt or the solution on floors, wagon beds, or anything burnable.
5. Use metal containers for chlorate solutions. If wooden tanks or containers must be used, keep them full of clear water for some weeks or months afterward.
6. Do not smoke or come near any fire while spraying or if wearing clothing worn while spraying.
7. Wash thoroughly or destroy, immediately after using, clothing and sacks, or other cloths, which have been soaked with the solution. Chlorate is easily removed by washing but until then - look out!!
8. Sprayed areas are a fire hazard until after a heavy rain. See that an accidental or spontaneous "burning-off" of such an area can do no damage by spreading to buildings, etc.
9. To be entirely safe, do not graze livestock on areas treated with chemicals until after a good rain.

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 John M. Amos
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--- COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS, VIRGINIA POLYTECHNIC INSTITUTE AND THE U. S. D. A. COOPERATING, BLACKSBURG, VIRGINIA. ---