Satisfactory Control Of Wild Morning-glory By Use Of 2,4-D Requires Proper Application

W. A. Harvey and W. W. Robbins

An extract from the College of Agriculture Agricultural Extension Service Circular 133, "2,4-D As A Weed Killer." Revised June, 1947

Wild morning-glory is highly susceptible to 2,4-D.

The top growth and most of the vertical roots are killed by proper application. Ordinarily, some laterals survive, and shoots not up at the time of spraying may later emerge unharmed.

Satisfactory control will result only when attention is given to the various factors affecting susceptibility. Treatment of old plants in dry areas, particularly following cultivation, has given poor control.

Dry-farmed Grain Land

Morning-glory may be effectively controlled on grain land in two ways.

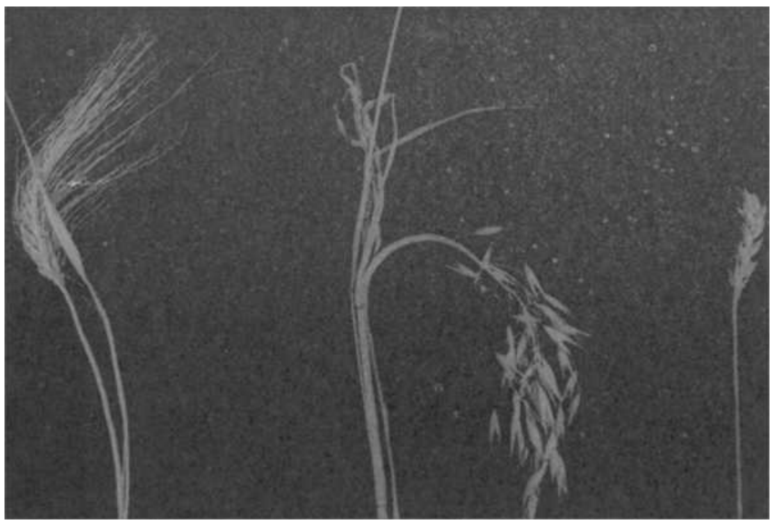
Selectivity

Because of the high susceptibility of morning-glory to 2,4-D, the selective control of this weed is often possible.

In strawberry plantings it has been effectively controlled without injury to the crop. If the strawberry plants are blooming at the time of spraying, the next crop of berries will usually be lost because the spray affects the blossoms. Little is known about the way in which different varieties of strawberries react to 2,4-D.

Precautions

In general, broad-leaved plants are



Injury to barley, oats and wheat from 2,4-D. Not more than three-quarters of a pound of 2,4-D acid per acre should be used when spraying for control of morning-glory in growing grain.

In the fall of the year previous to fallowing, the ground should be plowed or cultivated. In the fallow year, the morning-glory should be sprayed in the early summer when most of the plants have emerged, usually at about the time they begin to blossom. If there is sufficient soil moisture to allow new plants to develop normally, a second spray the same year may be applied. Often the soil is too dry to permit a successful second spray the same season. A rate of 1½ pound of 2,4-D acid per acre is recommended.

The second method of handling morning-glory on grain land is to spray it in the growing grain. Again, the land should be prepared in the fall and seeded, following a light disking, in the spring. Morning-glory should be big enough to spray before the grain is too tall. Plots on the University Farm at Davis were treated in this way in 1945. The grain is still relatively free from morning-glory and yields have been increased. In grain, not more than three-quarters of a pound of 2,4-D acid should be used.

Neither of these methods alone will result in eradication since some lateral roots usually survive from which new shoots emerge after treatment. New plants also grow from seed already in the soil. However, because of the low cost of the chemical, the control achieved is definitely profitable.

The regular use of 2,4-D on grain land as a control measure seems desirable, with eradication as a long-time objective.

Grain fields on which morning-glory has gone to seed for a number of years usually have enough seed in the soil to reinfest the area for many years.

Eradication on such areas is not possible with a single treatment of any chemical, but economic control is definitely feasible.

Irrigated Lands

On either surface or subirrigated land, morning-glory may be brought into a proper condition to spray more easily than on dry land.

A fall treatment is often possible following irrigation, but midsummer treatments, even on irrigated land, have not been very successful.

A minimum of soil disturbance is advisable in order to get uniform emergence.

Morning-glory may be treated in corn or milo after the crops are well established but before they cover the rows.

relatively susceptible to 2,4-D, but there are exceptions. For example, it is usually easier to effect a permanent kill of broad-leaved annuals than of perennials. However, since no plants are completely resistant, the chemical must be used carefully.

The action of 2,4-D is slow, sometimes requiring a month or longer to kill the tops and roots of the weeds, especially perennials. Two sprayings are often necessary because some plants are missed during the first spraying, and some new plants may come up from lateral roots which did not die. Watch the sprayed area closely and spray as soon as regrowth is large enough.

Soil sterilization may result from use of 2,4-D. How long the effects will remain depends upon amount of chemical used, temperature, rainfall or irrigation, soil type, and crop planted. While grains and grasses apparently suffer no damage if planted within a few weeks after spraying, beans, peas, lettuce, tomatoes, cabbage, broccoli, sugar beets, alfalfa and many other crops are extremely sensitive to small quantities of the chemical.

A sprayer or any other equipment which has contained 2,4-D must be thoroughly washed before it is used for other material. Otherwise, field, orchard, and ornamental plants may be damaged if even a small amount remains in the sprayer. One cold-water rinse is not sufficient. Use several changes of water—preferably warm—to which a little baking soda or washing soda has been added. Where an ester formulation has been used, preliminary washing with kerosene would be desirable.

When spraying a lawn or other area, never allow the spray to reach nearby ornamental or crop plants. Even small amounts of drift will injure these plants, some of which are highly sensitive.

Recently, grapevines from the San Joaquin Valley have shown what appeared to be damage from 2,4-D after treatment of morning-glory in the vineyard. The effects on the vines may have been due to drifting of spray, to action through soil, or both.

Experience with 2,4-D in vineyards is not extensive enough, either to encourage or discourage its use of weed control in such plantings.

W. A. Harvey is Associate in Botany and Associate in the Experiment Station, Davis.

W. W. Robbins is Professor of Botany and Botanist in the Experiment Station, Davis.

Agricultural Extension Circular 133, "2,4-D As A Weed Killer" may be secured without charge by addressing a request to: University of California College of Agriculture, Berkeley 4, California.

Underground Water Supply During Low Rainfall Seasons

C. N. Johnston

Seasons of low rainfall are generally periods accompanied by a high use of underground water by pumping, and that supply of water is apt to be short, too.

In years of subnormal rainfall the streams carry less water than usual during the flood periods, and may not flood at all. They dry up earlier in the spring or summer. Surface flow ceases earlier than in wetter years.

When enough water is not provided by rainfall, for the growing of crops, some supplemental water must be provided.

One source of supplemental water is the underground supply obtained by the use of wells and pumping.

Movement of Underground Water

Underground water is the by-product of seepage or percolation of the seasonal rainfall into the subsoil strata, either directly or from streambeds and the like.

Because it is the by-product of seepage from surface water, the underground supply is often short when the seasonal rainfall is below normal.

Like any surface stream, most underground waters are moving from their sources downward through gravels or sands toward some locality of escape.

When wells are drilled to water-bearing gravels or sands, they provide an open contact with such water as may be found there.

If the tapped flow of water can not pass the well freely, because of some obstruction beyond the well, pressure exists in the stratum at the location of the well. Under these conditions, the water from the stratum move into and upward in the well until a column of water stands in the well at a pressure equal to that of the water in the stratum.

The depth to water, from the surface of the ground to the standing water surface—the depth to static water—is easily measured.

Result of Lowered Water Level

During a period of low rainfall, less than the normal amount of water percolates into the water-conducting gravel or stratum. At the same time, the escape area for the underground stream is still functioning.

A 2-stage 12-inch turbine pump on a 12-inch well with a 55-ft. lift and a 20-ft. drawdown, to discharge 920 gallons a minute. Well is in Yolo County.

The pressure, initially due to maintained inflow, becomes less and the water column in the well is not held at the same high level as formerly. It is said that the static water level has dropped.

Drawdown

When a pump is put in a well and is operated, water is removed. This means water within the stratum can move into the well to replace the discharged water. It can not move into the well without moving downward, so the water level in the well, during pumping, stands at an elevation lower than the static level. This drop in elevation is the drawdown of the well caused by the removal of the quantity of water pumped to the surface.

When many deep well pumps operate in an area, they cause the water to flow into the area faster than formerly. They produce a local drawdown of static water levels in nearby unpumped wells.

During years of short water supply the underground flow is reduced at the source. At the same time, pumps work longer to make up the rainfall deficiency for the crops. As a result, static water levels and pumping water levels drop markedly.

Deep Well Pumps

The characteristic of deep well pumps of the turbine or centrifugal type, is such that any increase in pumping lift causes a reduction in the discharge rate. The reaction of all such pumps to lowered water table conditions is a reduced flow for irrigation.

A reduction in discharge rate means the pumps will have to run longer than originally to deliver the same volume of water.

Dropping Water Levels

If the water levels recede very much, the pumps actually begin to lose suction. The pump can not operate effectively and in extreme cases, not at all, when the water level drops severely.

The owner quickly observes these symptoms and his only recourse is to lower the pump by inserting standard sections supplied by the manufacturers. Lowering the pump will permit the continuation of pumping in these severe conditions.

The pump must lift the water an abnormal distance, with lowered water table conditions, and will continue to deliver at a reduced rate of flow regardless of the fact that it has been placed at a lower level in the well.

When normal water levels return, the pump will regain its original discharge rate.

If well water levels can not be expected to return to normal, as is the cases in some areas, and one desires to have the original discharge rate for his pump again, a simple economical solution unfortunately is not usually available. A complete new pump and motor may be the only answer in some extreme cases.

C. N. Johnston is Associate Professor of Irrigation and Associate Irrigation Engineer in the Experiment Station, Davis.

The problems of the cling peach industry are being studied intensively by the Division of Pomology.

Costs Of Methods Of Mechanized Harvesting Of Alfalfa Hay Are Subjects Of Comparative Study

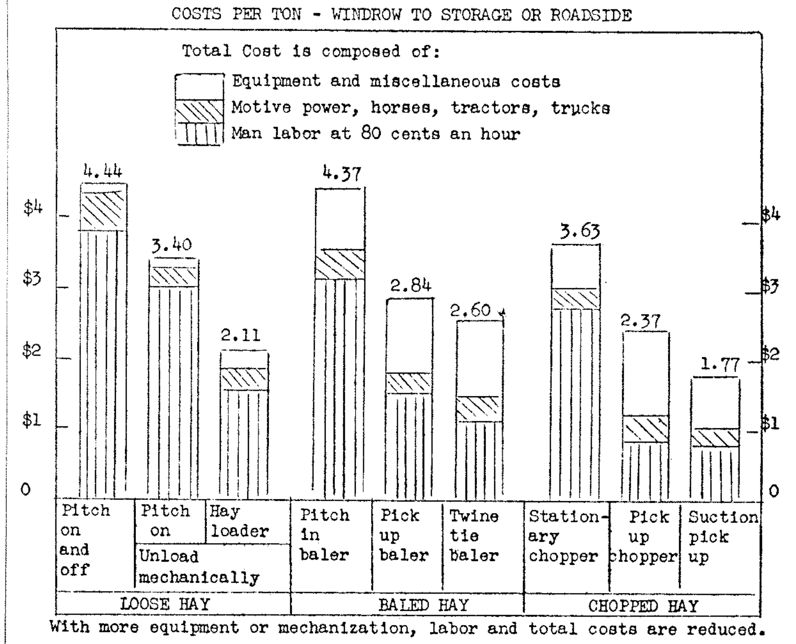
(Continued from page 1)

When the pitch on and mechanical unloading method was used with horse-drawn wagons, the output averaged 1.2 tons per hour at a cost of $3.40 per ton. With tractor-drawn wagons the cost of 1.3 tons per hour was $3.74 per ton.

Where the hay loader was used in the field and the unloading at storage was done mechanically—regardless of the wagon-power—the output was 1.6 tons per hour and the cost was $2.11 per ton.

Baled Hay

The pitch-in horse-drawn balers studied, averaged 2.2 tons output per hour at a cost of $3.29 plus $1.08 haul-out to roadside cost, making a total of $4.37 per ton, roadside. The output remained the same—2.2 tons per hour — with tractor-drawn balers, while the cost rose to $3.71 per ton.



With more equipment or mechanization, labor and total costs are reduced.

plus the $1.08, making a total of $4.79, roadside.

The most common present method of baling hay is that using a two or three wire-pick-up baler in combination with tractor mower, tractor side-delivery rake, and bale loader.

In this study the two-wire pick-up baler, which makes an 80 to 90 pound bale, averaged 3.7 tons output per hour at a cost of $1.98 plus an 89c haul-out cost, to total $3.87 per ton, roadside.

The three-wire pick-up baler produced bales between 120 and 130 pounds and averaged 3.8 tons output per hour at a $1.98 per ton cost, plus 80c for haul-out, to make a total of $2.78 per ton, roadside.

The automatic twine-tie baler produces bales weighing between 60 and 85 pounds. In this study this baler averaged 3.4 tons per hour output at $1.74 per ton, with an 86c haul-out cost, making a total cost of $2.60 per ton, roadside.

The great saving in man labor resulted in the automatic twine-tie baler being the most economical baling method in the survey.

Chopped Hay

Where loose hay was pitched on horse-drawn wagons in the field and transported to a stationary chopper where it was unloaded by hand, the output was 1.4 tons per hour. The cost of this method was $3.63 per ton.

The use of a hay loader and tractor-drawn wagons in the above operation cut the output to 1.1 tons per hour but also cut the cost per ton to $2.95.

Suction hay loaders, picking up the hay from windrows and cutting it up sufficiently for mechanical feeding to a stationary chopper, increased the output to 5.6 tons per hour at a cost of only $1.77 per ton.

The pick-up field chopper which picks up the hay from the windrow, chops it, and blows it into a wagon or van for transportation to storage, averaged three tons per hour at a cost of $2.37 per ton.

The actual costs disclosed by the survey reported here offer certain conclusions applicable under any set of wage, tractor, and equipment costs. Increased mechanization does result in lower labor and total costs, even though higher equipment costs are included.

Arthur Shultis is Specialist in Farm Management in Agricultural Extension and Associate on the Giannini Foundation.

CALIFORNIA AGRICULTURE

Established December 1946

Progress Reports of Agricultural Research, published monthly by the University of California College of Agriculture, Agricultural Experiment Station.

HAROLD ELLIS.....Director, Agricultural Information
W. G. WILDE.....Editor

California Agriculture, progress reports of agricultural research, will be sent free to any resident of the State in response to a request sent to the University of California College of Agriculture, 331 Hilgard Hall, Berkeley 4, California.