

# **gorse control**

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# Gorse Control

Controlling this weed is possible but  
difficult, research shows . . . . .

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**EQUIPPED** with thorny, 8-foot-high limbs, gorse has emerged as a public enemy along Oregon's coast.



**C**ONTROL of gorse—a pretty ornamental turned weed—is possible, but not easy. In Oregon, gorse grew as an ornamental planting near Bandon in 1894. Since then the legume has invaded an estimated 25,000 acres, primarily in western Lane, Coos, and Curry counties.

Gorse has become a major menace in certain areas because of its aggressive-ness and inflammability. A sound control program for certain gorse-infested areas can be developed, however, using research methods reported in this bulletin.

Control in cultivated fields is relatively simple. Yearly tillage will eventually bring about control.

Control in pasture is difficult, but possible. Clearing the land by bulldozing is the first step. Cropping for two or more years destroys many seedlings. Preparation of a good seedbed, application of fertilizer, and planting of adapted grasses and legumes help prevent reinfestation.

Close grazing, especially by sheep, is an essential step in managing gorse-infested pastures. Spraying with a brush killer after sub clover has gone to seed will control most of this gorse.

Goats offer a means of control in inaccessible places. The original stand of gorse should be burned and a good fence provided to confine the goats.

On other nontillable land, burning,

then spraying with a chemical weed killer offer the best control possibilities. Follow-up spraying will be needed for 1 or 2 more years. Soil sterilants also are effective.

Individual gorse plants can be controlled by cutting, then treating the stump with a brush killer.

Establishing the seriousness of this weed in the public mind is one of the principal needs in any gorse control program. Many folks feel that because of its relatively slow initial spread the weed is of little consequence. This attitude is unrealistic.

There is no easy method of gorse control. Vigorous plant growth, long life of the many hard seeds produced, plus adaptation to conditions unfavorable to most other plants combine to make control a difficult problem.

Gorse is a problem to be faced by more than individual farmers. Communities in an infested area have a stake, too. The history of gorse should be a warning to all that it must be combatted while in small controllable patches.

Few weeds take over land more completely, or are more difficult to kill than gorse. The constant fire hazard to timber and the crowding of agricultural land and resort areas—with the inevitable lowering of land values—make gorse a public enemy with high priority.

## What Is Gorse?

Gorse or Irish furze *Ulex europaeus* is a leguminous shrub which closely resembles Scotch broom. During the blooming season (under western Oregon conditions normally January to June), gorse is covered with a profusion of showy orange-yellow blossoms. The plant is adapted to regions of mild winters and grows best in sandy or coarse gravelly soils well supplied with moisture. Being a legume it thrives in soils having a naturally low nitrogen content. It is more tolerant of soil acidity than most legumes.

### Gorse a fire hazard

Under adaptable conditions, gorse makes a vigorous, dense growth. It grows especially well on sand dunes, gravel bars, fence rows, logged-off and

burned-over forest land, along roadways, in pastures, and in other areas if not disturbed by tillage or shaded by other plants. Once established it excludes almost all other vegetation. The mature plant is covered by sharp spines which discourage animals from feeding. The plant contains a moderate amount of oil (2.5-4.0 per cent). Under normal development conditions the oily plant grows from the center outward, leaving a central mass of dead, dry matter. When fired this center burns to form a chimney or draft which aids in increasing fire intensity. When relative humidity of the atmosphere is low a dense gorse infestation will burn vigorously and create a serious fire hazard.

## Gorse History in Oregon

Gorse has been reported in every coast county and in most Willamette Valley counties. It is most serious in Curry, Coos, and western Lane counties. There is no accurate measurement of the areas now infested but conservative estimates indicate heavy gorse infestation on not less than 25,000 acres.

In the areas of greatest infestation, the vicinity of Bandon in Coos county, on the Elk River in Curry county, and on Heceta Head in western Lane county, gorse was introduced as an ornamental shrub. Early records indicate that gorse was introduced to the Bandon area late in the nineteenth century. The following letter was introduced as part of a record at a public hearing on

gorse control held at Bandon in August 1944.

"Bandon, Oregon  
August 15, 1944

"To Whom It May Concern :

I can recall back to May 1894 when I saw two rows of gorse approximately twelve feet long and two feet high at the place known at Lord Bennett's, an early resident of Bandon. He stated to me at that time that he had brought the seed from Ireland. I cannot recall any other gorse in this area. Since then the gorse got out of control and spread in the area of Bandon until by 1936 it was scattered all through the area around Bandon and was a great aid to the fire that destroyed Bandon. Since 1936 it has spread more rapidly than it ever had before.

Michael Breuer"

## How Gorse Spreads

Distribution of gorse is largely by seed although individual plants may be spread by rhizomes. The plant produces an abundance of seed similar to

those of hairy vetch. On warm dry days the seed pods pop and often spread seed for a distance of several feet. The principal distribution, how-

ever, is by animals, cars, trucks, and logging equipment. Gorse growing along streams is distributed by the water. It has also been scattered in gravel used for road construction and taken from streams along which gorse is growing.

The initial spread of gorse is slow. The seed is very hard and apparently will lie in the ground for many years before natural germination. Control plantings of gorse seed under favorable conditions have shown no seedling emergence in nine years. Observations indicate that seed 25 years old may germinate and grow. The hard gorse

seed is rather resistant to fire. Observations following complete destruction of gorse stands from six to eight feet high show heavy seed germination within sixty days. Samples from different areas indicate four to nine million seeds per acre in the surface inch of soil. Fire may destroy many of the plant crowns but seems to encourage plant re-establishment by hastening seed germination. Gorse seedlings appear in fields many years after the original stands have been destroyed. Any system of control, therefore, must recognize that the seedlings must be kept destroyed for an extended period.

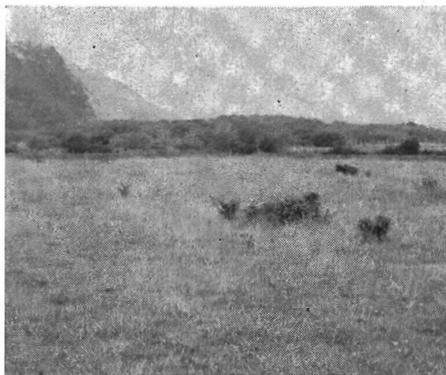
### Gorse Is a Major Menace

The wide-spread occurrence of gorse in western Oregon, western Washington, and northern California illustrates its adaptability. Introduced as an ornamental, the plant found favorable growth conditions and became much more of a pest than in its native habitat. Time required for seed germination and relatively slow spread following original planting deceive many into believing that the plant is no hazard. This is a snare and a delusion. There are few weeds which, when once established, utilize the land so completely or are so difficult to eradicate.

As gorse usually becomes established on nontillable land and in inaccessible places, establishment of a control program is extremely difficult. The history of gorse menace in areas of heaviest infestation should be a warning to all communities to combat small infestations vigorously while still controllable. Constant fire hazard to timber and encroachment on agricultural land and resort areas, with subsequent reductions in land values, make this plant a public enemy with high priority.

When gorse infestation is limited to

a few plants or to a few square rods, it can be eradicated. Once the infestation becomes widespread it can be con-



**ERADICATE gorse before it becomes widespread. Once seed supply built up, eradication impractical.**

trolled but probably not eradicated. Once a seed supply has been established in a wide area it becomes impractical if not impossible to eradicate. Then, the only recourse is to develop a program that will prevent spread of the plant and reduce aggressive growth so the land may be used for productive purposes. *Best time to control gorse is when there is but a single plant.*

## The Research Program

Recommendations made in this bulletin are based largely on experiments established in Curry county in 1945, and continued until 1950. Since 1950, periodic observations have been made of previous treatments.

At the request of certain groups in southwestern Oregon, State funds were appropriated in 1945 to establish a gorse research program. The availability of these funds was contingent on their being matched. Curry, Coos, Douglas, and Lane counties provided matching funds for this work. During

the first year a contribution was made by W. J. Sweet of Bandon, who also provided the land on which most of the experiments were conducted. At that time there was no record of any research being done elsewhere in the world, although in the British Isles and on the continent of Europe observations on the persistence of the plant had been made. Subsequently, a rather extensive research project for gorse control was established in New Zealand where conditions are not too different from western Oregon.

## Control of Individual Plants

Occasional infestations of gorse are composed of a limited number of large plants. These serve as a source of future infestation from the seed produced. The simplest way to control this type of infestation is to remove the top and paint the stump with one of the hormone weed killers. A small amount of the undiluted weed killers is sufficient to kill the stump. Brush killer is an effective material. A series of cuttings of large gorse plants was started in November and continued until March. Nine plants, all over two inches in diameter, were cut at two week intervals and the stumps treated after cutting. Three plants each were treated with three different materials, 2,4-D, 2,4,5,T, and brush killer. Out of

a total of ninety plants so treated only three made any regrowth.



**PAINT STUMP** with undiluted 2,4-D to prevent gorse regrowth. Painting kills plant's tap root.

## Control on Nontillable Land

### Apply chemicals

Control of gorse by chemicals appears to be feasible in a number of situations. Small isolated infestations can be controlled in this way better than in any other. Chemicals are also suitable for control of gorse in fence

rows, along roadways, around buildings, and in pastures. The use of chemicals for control on extensive areas is probably impractical because of expense. In some cases, infestations are relatively inaccessible to spray equipment. It should be remembered, too,

that no chemical will give 100 per cent kill from a single application. There are occasions when all plants may be killed by the application of a chemical which acts as a soil sterilant but it should be remembered that gorse is a deep-rooted plant with large reserves of food that enable it to recover after serious injury. Probably more important in gorse control, however, is the matter of re-infestation by seed. The large amount of seed in the soil under any area infested by gorse, makes it necessary to establish follow-up practices to control re-infestation from seedlings.

### **Burn gorse first**

Wherever possible, burn gorse as the first control step. While gorse will burn readily under many conditions, a good clean burn can be obtained only when the relative humidity is fairly low (usually below 50 per cent). The stands of gorse, from 4 to 6 feet in height, contain a considerable amount of dead material on the inside of the plants. On days when the humidity is low, these plants will burn quickly and

cleanly. The small amount of oil in the gorse plant will aid in the burning. Unless the stand is dense, of sufficient height, and the humidity is low, the fire will burn only the dry portion and leave the main gorse stalks standing and little damaged. These plants will start their regrowth almost immediately.

When gorse has been heavily burned, the plants are injured even though regrowth does occur at the crown. After this regrowth is from 3 to 12 inches in height it should be sprayed with the appropriate chemical. Gorse in this condition requires only a fraction of the chemical necessary where the gorse was not burned. The amount of chemical can often be reduced as much as 75 per cent without reducing the effect on the plant.

A further advantage of burning is that the fire will crack the seed coats of many seeds accumulated in the soil. These seeds will germinate readily when moisture is available, and the young plants can be killed readily with many of the sprays.



**BURNING** gorse is usually the first step in a control program. The plant contains from 2.5 to 4 per cent oil, with dead material in the center. The legume fires well when humidity is below 50 per cent.

### Chemicals vary in control

Many chemicals are used to control gorse although they vary in their effectiveness. Probably, the best materials to use under the widest range of circumstances, are the brush killers. These are mixtures of 2,4,5-T and 2,4-D. Usually the ester form is best. When brush killers are used at rates which may vary from 3 to 5 pounds of

the ester form of 2,4-D will certainly put gorse under control, although it is much less effective than the combination of the two materials.

### Soil sterilants effective

Certain soil sterilants are extremely effective where they can be used. A combination of sodium arsenite and borax, in which the sodium arsenite is used at 2 pounds per square rod and



**SODIUM ARSENATE**—a lasting soil sterilant—effectively controls gorse. Use where poison isn't a hazard.

the parent acid material per acre, they will give effective control for at least a year. A high percentage of the plants should be killed by one application. Follow-up applications need not be so heavy but will be necessary for at least one or two more years. Following the second application most of the gorse re-infestation will be from seedling growth, although there may be occasional persistent old plants which will need to be sprayed. After the second year it may not be necessary to make a general spray application but rather to use a spot spraying technique in which only infesting plants are hit with the spray. The combination of 2,4,5-T and 2,4-D appears to be as fully effective as the straight 2,4,5-T material. Use of 2,4-D alone will reduce gorse growth and continued application of

the borax at 6 pounds per square rod has given effective control. In a few instances good control was obtained from one application. In most cases excellent control has been obtained from two applications in successive years. Certain experimental plots treated in this manner have shown very little regrowth either from original plants or seedlings at the end of six years. In these cases the soil has remained rather sterile as only an occasional plant of grass or native shrubs has been re-established. Long sterility of the soil following the use of arsenic, plus the additional hazard introduced by the poisonous nature of the material, make the arsenic compounds of only limited use in connection with gorse control.

Another chemical which gives excellent results through soil sterilization is

CMU. When applied at 40 pounds per acre CMU has given excellent results for one year or more. Some regrowth has been noted at the end of two years. When CMU is applied at 80 pounds per acre or more, no regrowth occurred during a two-year period following application. The soil sterility developed by CMU does not appear to be as long lasting as that developed from the use of arsenic.

Ammate was one of the first chemicals used successfully in gorse control. This is an effective brush killer although applications are required on successive years for successful control. On gorse regrowth following a burn, ammate applied at the rate of 3 pounds per rod for two successive years will bring reasonable control. As ammate is a nitrogenous compound, the nitrogen in the material becomes available for plant growth after a certain period. Consequently, the sterilizing effect of ammate application is only of limited duration. Nitrogen in the material actually serves as a fertilizer for subsequent plant growth and good grass stands usually follow gorse reduction. When the original growth is treated with ammate the regrowth may be kept under control by use of brush killer or similar compounds.

### **Chemicals must kill roots**

Many chemicals cause rapid destruction of the tops of the plants but are

not effective in gorse control. Unless the material which causes the destruction of the tops is translocated into the roots, or unless it is held in the soil to cause a sterilizing effect, gorse plants recover very quickly. The tap root of the gorse plant contains sufficient food reserves to enable early regrowth unless interfered with by the chemical as indicated. There may be certain situations where rapid destruction of the tap root, by means of chemicals, is desirable, but for the most part such chemicals should be avoided. Where they are used, provisions should be made to follow up with chemicals of the hormone type such as the brush killers.

The effectiveness of certain chemicals in gorse control is shown in Table 1. (See page 15.) Results indicate that in general the chemicals should be applied before September for best results. The materials that showed best in this trial also gave good results in other trials. Residual effect of the arsenic compounds is indicated by subsequent observations in May 1954. For example, a plot which received sodium arsenite and borax in 1947 and 1948 had a 30 per cent stand of small gorse. Another plot treated the same two years with sodium arsenite, arsenic trioxide, and borax had no gorse and little else. The arsenic-borax-lye combination in 1948 and 1949 gave similar results.

## **Control on Tillable Land**

### **Crop land**

On land which can be cultivated, removal of gorse by bulldozing is the first operation. Gorse can be bulldozed in windrows and burned at an opportune time. It is important to remove as many roots as possible since new plants

propagate readily from old roots. On land which can be cropped each year gorse plants and seedlings are destroyed by the tillage practices. It usually is necessary to use chemicals to control gorse in fence rows so as to prevent reseeding.

## Pasture

In establishing pastures on gorse-infested land it is desirable to crop the land for a period of at least two years following clearing. This gives an opportunity to eliminate old plants that may be left, and to destroy large numbers of seedlings. Tillage practices expose large numbers of seeds buried for many years, many of which will germinate promptly.

Following the required cropping period a good seedbed should be prepared. In the coastal region it is usually desirable to apply at least 300 pounds of superphosphate per acre while the seedbed is being prepared. It is usually helpful also to apply from 20 to 40 pounds of nitrogen per acre. Generally the seeding should be done in the early fall. On bottom land pastures where irrigation is available, a mixture of Ladino clover and grass provides a productive and nutritive pasture. Lush growth of pasture under these conditions tends to discourage re-establishment of gorse. In the event individual plants become established, they can be readily controlled by spot treatment with ammate or brush killer. A little

time spent with a portable knapsack sprayer will usually control these plants satisfactorily.

On upland plantings on less fertile soil where moisture conditions prevent a long growing season, it is desirable to plant grasses and legumes adapted to such conditions. Such grasses as Alta fescue, perennial rye, Orchard, Tualatin meadow oat, Chewings or Creeping red fescue, and Highland bent usually grow well and will develop a dense sod. A planting of seed from 4 to 6 pounds of sub clover per acre in combination with 15 to 20 pounds of grass seed is recommended. Sub clover is the only legume recommended because of its adaptability to good gorse control practices.

In establishing pasture on upland from which gorse has been cleared it is desirable to apply liberal quantities of nitrogen. The amount needed will vary from 40 to 100 pounds of nitrogen per acre. Gorse, like many other legumes, has difficulty competing with good grass stands. Once pasture is established it is necessary to graze closely. Periodic close grazing by sheep appears to be essential to good gorse



**SELECTIVE SPRAYS** control gorse plants in pastures. Need to spray when weed is young. Above, pasture was sprayed repeatedly while gorse was small, weed almost eradicated when picture taken.

control under these upland pasture conditions. In these close grazing operations sheep will eat the gorse seedlings readily.

**Fertilizing important**

Fertilizer treatments on newly established upland pasture from which a dense growth of gorse had been cleared, indicate that fertility is particularly important. In this trial ammonium sulfate fertilizer was applied at 100, 200, 300, and 400 pounds per acre in comparison with an untreated check strip. Table 2 indicates the success of this treatment.

**TABLE 2—Gorse Seedlings per Six Square Yards**

Year	Check	Ammonium sulfate in pounds per acre			
		100	200	300	400
1947	44	14	5	3	1
1948	100	25	20	4	0
1949	55	15	14	2	0

These figures may be somewhat misleading because there may have been more gorse seeds in the check and lightly fertilized area. Careful study throughout the area, and observation of the sheep indicates much heavier grazing on the fertilized portion and a much denser growth of grass. Fertility experiments elsewhere indicate that the foliage on the fertilized area would be higher in protein content. Preference of animals for grazing in this portion of the area would indicate a superior

type of forage. It is believed that the closer grazing in this area was partly responsible for the lesser establishment of gorse seedlings.

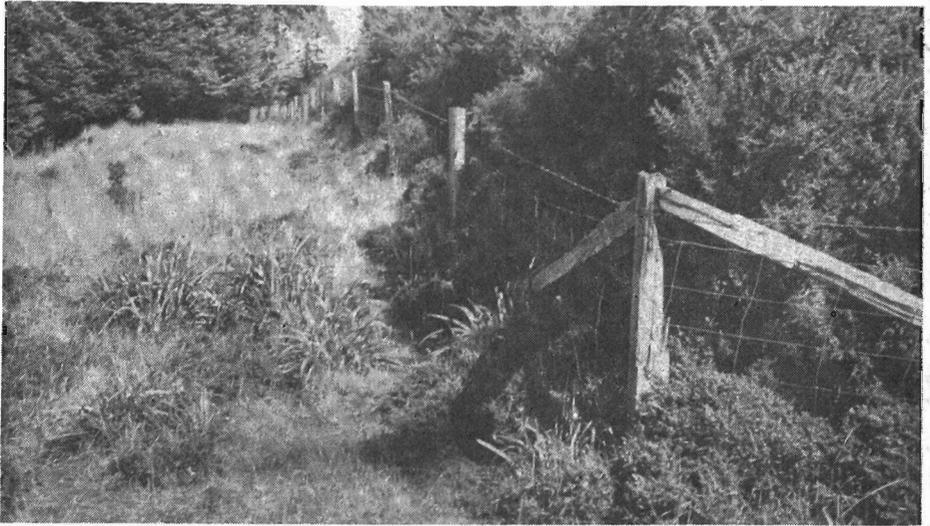
Close grazing by sheep will also encourage the growth of sub clover. It may be necessary to make annual applications of nitrogen fertilizer until the stand of sub clover has developed enough to supply adequate nitrogen to stimulate a lush growth of grass. Occasionally it may be necessary to use either lime or phosphorus to stimulate the clover growth. This can be determined by a soil test. Important to keep in mind in establishing pasture under these conditions is that the best growth of grass and clover is the best defense against gorse establishment. Good physical condition of the land and high soil fertility are imperative if good stands are to be obtained.

Close grazing and fertilization will not control all gorse seedlings. For the first few years after establishment it may be necessary to spray the pastures with brush killer. This is possible when sub clover is the only legume in the pasture as spraying can be done in August after the sub clover has gone to seed. The young plants are easily killed by one application of from 1 to 2 pounds of parent acid material per acre. An occasional gorse plant that escapes this treatment should be killed by spot spraying. After a few years, often only two or three, scattered gorse plants may be controlled adequately by spot spraying. One man, equipped with a knapsack sprayer, can cover a large pasture in one day.

**Control by Goats**

In many areas of gorse infestation it is not possible or economically feasible to clear the land and establish im-

proved pastures. Under these conditions the use of goats offers an economical and practical method.



**GOATS** will eat gorse regrowth once an old stand has been brought under control. Goated area left, not goated, right. Best to burn old stands, then let goats eat regrowth. Animals relish gorse browse.

### **Burn gorse first**

In preparing the land for use by goats burn gorse first. Burn only when the gorse stand is dense, when it has reached a height of 4 to 6 feet, and when relative humidity is low (50 per cent or less). Then provide a good fence. Goats are curious animals and often appear to resent being confined. An attempt to confine goats with anything but a first-class fence is likely to be unsuccessful. Goats should be confined in the area when regrowth from crowns or seedlings is 2 to 4 inches in height. At this stage the vegetation is soft and palatable and is relished by both goats and sheep. Goats prefer considerable browse in their diet and often eat relatively large gorse even when there is plenty of grass. In the coastal region it is possible to keep goats on an area throughout the entire season, although it is necessary to watch their condition carefully during certain seasons. Enough goats should be confined to keep the browse eaten down rather closely. As the gorse is

kept grazed, grass usually begins to appear in the areas formerly occupied by the large plants. It is then usually desirable to utilize some sheep also in grazing the goated area.

A period of approximately 2 years of grazing by goats is required before there is any particular reduction in the number of gorse crowns. In that time, however, thousands of seedlings per acre have been destroyed and from 10 to 30 per cent of the original old plants are also destroyed or distinctly weakened. In subsequent years the stands of gorse will gradually be reduced. It is not known how long a period will be required to eliminate gorse entirely from an area. As the gorse is reduced however, the amount of grass can be increased so an area once practically useless for forage production can be converted to one producing appreciable amounts of pasture for both goats and sheep. In this instance at least, the old adage that one goat will provide or "make" pasture for one sheep appears to be correct.

## Control by Re-forestation

Experience in Europe and observation of various areas in Oregon indicate clearly that gorse can be controlled when subjected to heavy shade. It is possible to plant trees in a gorse-infested area and establish stands of timber that eventually control gorse. The difficulty of this method, however, lies in the fact that gorse is rather inflammable and presents a serious fire hazard, especially during the dry season. Experience in the gorse-infested areas of Oregon shows that re-forestation often occurs following an original fire. Repeated fires destroy the young trees and eventually destroy all seeding stock, thus effectively preventing any natural re-forestation. This has occurred in the area south of Bandon.

### Burn before re-seeding

In the re-forestation of a gorse-infested area it is desirable to burn gorse as completely as possible prior to re-seeding. If a good burn can be obtained and the regrowth sprayed with a material such as a brush killer, the gorse

regrowth will be held back for at least a year. This gives the young tree seedlings an opportunity to establish themselves. If spraying before re-forestation is not practiced it probably is desirable to use more seedlings per acre. Once established they appear to grow rather well in the dense gorse, and if fire can be kept out of the area they eventually will appear above the gorse and will control it. This is a lengthy procedure, possibly 25 to 35 years.

In connection with the gorse control experiments in Curry county, the State Department of Forestry cooperated by planting trees on a block of land available for experimental purposes. Some 15 to 20 acres solidly infested with gorse were planted to various trees, principally Port Orford Cedar, but including a number of other species. These plantings were made in 1947 and 1948. Good survival resulted, and if fire can be kept out of this area the trees should begin to appear above the gorse in 8 to 10 years.



**TREE SEEDLINGS** can survive intense gorse competition provided fire is kept out. Left is a 2-year pine seedling after it has been set out one year. Right, cedar three years older is as tall as gorse.



**CONTINUED USE** of selective sprays keeps gorse under control, permits growth of older plants such as huckleberry and fern. These and other plants can serve as a firebreak in solid gorse patches.

### Use firebreaks

Maintenance of an adequate fire break around tree plantings in a gorse area is essential. This can be done in a number of ways. One of the simplest ways is to make an original chemical treatment of brush killer to gorse regrowth at about 3 pounds to the acre. This should control not only all gorse for at least a year but most other vegetation as well. In succeeding years with some regrowth of gorse and establishment of other types of vegetation, the area should be sprayed annually with the ester form of 2,4-D. While this material is not quite as effective on gorse as is the brush killer, it eventually kills a substantial percentage of the plants and keeps the remainder under control. Aside from economy the advantage of using this material is that it allows certain native species such as Salal and Huckleberry to become established. Should there be open spaces, grass will become established.

In a series of trials in the gorse area at Port Orford one treatment called for annual spraying with 2,4-D. At the end of five years approximately 75 per cent of the original gorse stand had been controlled and no gorse was higher than 1 foot. These had established an excellent stand of Salal and Huckleberry material that provides a rather effective fire break. In maintenance of such a fire break it is essential that spraying be done just as long as gorse continues to grow. Spraying should be done before the gorse gets high enough to create a fire hazard. Small gorse a foot or two in height is no particular hazard. Only when the material gets up 4 and 5 feet high and when a reserve of dried material accumulates on the inside of the dense growth does fire hazard become acute. If the gorse is allowed to grow to such heights and is then killed by chemicals it creates a natural fire hazard which needs to be removed.

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The writer gratefully acknowledges assistance from the following: H. A. Schoth for planning experimental work on pastures; V. H. Freed for developing chemical treatments; Don C. White for assistance in conducting the experiments on which this circular is based; and to the State Department of Forestry for cooperation on the reforestation phase of the program.

**TABLE 1—Effect of Selected Chemicals Applied to Gorse on Different Dates**

Month applied	Year and chemical applied					Results*	
	1946	1947	1948	1949	1950	April 1950	April 1952
May.....	Ammate 3 lb	Ammate 3 lb	Ammate 3 lb	None	Ammate 1.5 lb	A	B+
May.....	Ammate 3 lb	Ammate 3 lb	Ammate 1.5 lb	None	Ammate 1.5 lb	A	A
July.....	Ammate 3 lb	Ammate 3 lb	Ammate 3 lb	None	Ammate 1.5 lb	A+	A+
July.....	Ammate 3 lb	Ammate 3 lb	Ammate 1.5 lb	None	Ammate 1.5 lb	A—	
July.....	Ammate 3 lb	Ammate 3 lb	Ammate 1.5 lb	None	None	A	A—
Sept.....	Ammate 3 lb	Ammate 3 lb	Ammate 3 lb	None	Ammate 1.5 lb	Burned	A
Sept.....	Ammate 3 lb	Ammate 3 lb	Ammate 1.5 lb	None	Ammate 1.5 lb		B
May.....	2,4-D Dust	Sod. Ars. Borax Ars. Triox.	Sod. Ars. Borax Ars. Triox.	None	None	A+	A
May.....	2,4-D Dust	Sod. Ars. Borax Ars. Triox.	None	None	Sod. Ars. Borax Ars. Triox.	A+	A+
July.....	2,4-D Dust	Sod. Ars. Borax Ars. Triox.	Sod. Ars. Borax Ars. Triox.	None	None	A+	A
July.....	2,4-D Dust	Sod. Ars. Borax Ars. Triox.	None	None	None	A	
Sept.....	2,4-D Dust	Sod. Ars. Borax Ars. Triox.	Sod. Ars. Borax Ars. Triox.	None	None	A+	A+
Sept.....	2,4-D Dust	Sod. Ars. Borax Ars. Triox.	None	Sod. Ars. Borax Ars. Triox.	None	A+	A
Sept.....	2,4-D Dust	Sod. Ars. Borax Ars. Triox.	Sod. Ars. Borax Ars. Triox.	Sod. Ars. Borax Ars. Triox.	None	A+	A
May.....	Sod. Ars. Borax	Sod. Ars. Borax	Sod. Ars. Borax	None	None	A+	A
May.....	Sod. Ars. Borax	Sod. Ars. Borax	None	None	None	A+	A+
May.....	Sod. Ars. Borax	Sod. Ars. Borax	Sod. Ars. Borax	None	Sod. Ars. Borax	A	A—
July.....	Sod. Ars. Borax	Sod. Ars. Borax	Sod. Ars. Borax	None	None	A+	A
July.....	Sod. Ars. Borax	Sod. Ars. Borax	None	None	None	A+	A
Sept.....	Sod. Ars. Borax	Sod. Ars. Borax	Sod. Ars. Borax	None	None	A+	A
May.....	M. ester 2,4-D	M. ester 2,4-D	M. ester 2,4-D	M. ester 2,4-D	M. ester 2,4-D	B	C
July.....	M. ester 2,4-D	M. ester 2,4-D	M. ester 2,4-D	M. ester 2,4-D	M. ester 2,4-D	B	C
Sept.....	M. ester 2,4-D	M. ester 2,4-D	M. ester 2,4-D	M. ester 2,4-D	M. ester 2,4-D	C+	C—

\* Results: A—Good control

B—Moderate control

C—Poor control

D—Slight reduction in growth

**TABLE 1—Effect of Selected Chemicals Applied to Gorse on Different Dates—Continued**

Month applied	Year and chemical applied					Results*	
	1946	1947	1948	1949	1950	April 1950	April 1952
May.....	Butyl ester 2,4-D	Butyl ester 2,4-D	Butyl ester 2,4-D	Butyl ester 2,4-D	Butyl ester 2,4-D	B	C+
July.....	Butyl ester 2,4-D	Butyl ester 2,4-D	Butyl ester 2,4-D	Butyl ester 2,4-D	Butyl ester 2,4-D	B	C
Sept.....	Butyl ester 2,4-D	Butyl ester 2,4-D	Butyl ester 2,4-D	Butyl ester 2,4-D	Butyl ester 2,4-D	C	C—
May.....	Atlacide	Atlacide	Atlacide	Atlacide	Atlacide	A+	A
July.....	Atlacide	Atlacide	Atlacide	Atlacide	Atlacide	A+	A+
Sept.....	Atlacide	Atlacide	Atlacide	Atlacide	Atlacide	Burned	B
May.....	Methoxene	Atlacide-Borax	Atlacide-Borax	Atlacide-Borax	None	A	A—
May.....	Methoxene	Atlacide-Borax	Atlacide-Borax	Atlacide-Borax	Atlacide-Borax	B	C
July.....	Methoxene	Atlacide-Borax	Atlacide-Borax	Atlacide-Borax	None	A	B—
July.....	Methoxene	Atlacide-Borax	Atlacide-Borax	Atlacide-Borax	Atlacide-Borax	A—	A
Sept.....	Methoxene	Atlacide-Borax	Atlacide-Borax	Atlacide-Borax	Atlacide-Borax	Burned	C
May.....	Avon	Avon	Sod. Arsenite borax-lye	Sod. Arsenite borax-lye	None	A+	A+
July.....	Avon	Avon	Sod. Arsenite borax-lye	Sod. Arsenite borax-lye	None	A+	A
Sept.....	Avon	Avon	Sod. Arsenite borax-lye	Sod. Arsenite borax-lye	None	A+	A
May.....	Avon-PCP	Avon-PCP	Avon-PCP	2,4,5-T	2,4,5-T	A	A
May.....	Avon-PCP	Avon-PCP	Avon-PCP	2,4,5-T	None	A+	A+
July.....	Avon-PCP	Avon-PCP	Avon-PCP	2,4,5-T	None	A+	A
Sept.....	Avon-PCP	Avon-PCP	Avon-PCP	2,4,5-T	None	A	B—
May.....	2,4-D Dust	Borax	Borax	Borax	Borax	B	C
July.....	2,4-D Dust	Borax	Borax	Borax	Borax	C	D
Sept.....	2,4-D Dust	Borax	Borax	Borax	Borax	C	C—
May.....	Methoxene dust	Ammate	Ammate	Ammate	None	A+	A
July.....	Methoxene dust	Ammate	Ammate	Ammate	None	A+	A
Sept.....	Methoxene dust	Ammate	Ammate	Ammate	None	A+	A
May.....	Ammon. Thiocy.	Ammon. Thiocy.	Ammon. Thiocy.	Ammon. Thiocy.	Thalic acid	B	C
July.....	Ammon. Thiocy.	Ammon. Thiocy.	Ammon. Thiocy.	Ammon. Thiocy.	Thalic acid	B	C
Sept.....	Ammon. Thiocy.	Ammon. Thiocy.	Ammon. Thiocy.	Ammon. Thiocy.	Thalic acid	C	C—

\* Results: A—Good control

B—Moderate control

C—Poor control

D—Slight reduction in growth