

AGRICULTURAL EXPERIMENT STATION
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Circular of Information No. 450

March 1949

GORSE CONTROL

by

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What is Gorse?

Gorse or Irish furze (*Ulex europeaus*) is a leguminous shrub which closely resembles Scotch broom. During the blooming season, which under Western Oregon conditions normally extends from January until 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 which have a naturally low nitrogen content. It is more tolerant of soil acidity than most legumes.

Under conditions where it is adapted gorse makes a vigorous, dense growth. It grows especially well on sand dunes, gravel bars, fence rows, on logged-off and burned-over forest land, along roadways, in pastures and in other areas where it is not disturbed by tillage or where it is not shaded by other plants. Once established it excludes almost all other vegetation. The mature plant is covered by sharp spines which seriously discourage its use by animals. The plant contains a moderate amount of oil (2.5 - 4.0 per cent). Under normal conditions of development the oily plant grows from the center outward, leaving a mass of dead, dry matter in the center. When the plant is fired this center burns to form a chimney or draft which aids in increasing the intensity of the fire. When the relative humidity of the atmosphere is low a dense gorse infestation will burn vigorously and create a serious fire hazard.

Gorse 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 by gorse but conservative estimates indicate heavy gorse infestation on not less than 25,000 acres.

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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.

In the areas of greatest infestation, namely in 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 as 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.

The distribution of gorse is largely by seed although individual plants may be spread by rhizomes. The plant produces an abundance of seed. The seed is quite similar to that of Hairy vetch. On warm dry days the seed pods will pop open and will often spread seed for a distance of several feet. The principal distribution, however, is by means of 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 when it is taken from streams along which gorse is growing.

The initial spread of gorse following its establishment is slow. The seed is very hard and apparently will lie in the ground for many years before natural germination occurs. Control plantings of gorse seed under favorable conditions have shown no seedling emergence in three and one-half years. Observations indicate that gorse seed as much as 25 years old may germinate and grow. The hard seed of gorse is rather resistant to fire. Observations following a complete destruction of gorse stands from six to eight feet high show heavy seed germination within sixty days. Samples from different areas indicate as much as from 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, in Western Washington, and in Northern California illustrates the adaptation of the plant. Originally introduced as an ornamental, the plant found favorable growth conditions and became much more of a pest than in its native habitat. The time required for seed germination and the relatively slow spread following an original planting deceives 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, the establishment of a control program is extremely difficult. The history of the gorse menace in the areas of heaviest infestation should be a warning to all communities to combat small infestations vigorously while they are still controllable. The constant fire hazard to timber and the encroachment on agricultural land and resort areas, with the subsequent reductions in the land value, make this plant a public enemy with a high priority.

Gorse Control by Chemicals.

The control of gorse by chemicals appears to be feasible in several situations. It appears that 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, and in pastures. The use of chemicals for control on extensive areas is probably not practicable because of the expense. No chemical used thus far will give 100 per cent control from one application. Gorse is a deep-rooted plant and it is difficult to kill all of the plants in an area at one time. In addition the large amount of seed in the soil will cause a re-infestation which requires follow-up treatments at yearly intervals.

Wherever possible the gorse should be burned before chemicals are applied to the low regrowth. When chemicals are applied to gorse which is from four to twelve inches high the amount needed is only about one-fourth to one-third of that required when the gorse is from four to six feet in height. Chemicals which have given the best results in experimental work so far are Ammate and certain combinations of sodium arsenite and borax. When Ammate has been applied to large gorse, as much as ten pounds of material per square rod has been required for two successive years to bring reasonable control. On the other hand, when Ammate has been applied to small gorse, good control has been obtained from as little as three pounds per square rod for two years. In certain cases the second year application may be reduced to two pounds per square rod or less. Subsequent applications of Ammate at the rate of about one pound per square rod to control seedlings is sufficient.

Sodium arsenite at two pounds per square rod and borax at six pounds per square rod as a mixture have given good control the first year. This material appears to sterilize the soil effectively for a period of

twelve to eighteen months. Certain grasses, however, tend to reappear in treated areas toward the end of the first year, and this may be general during the second year under conditions of heavy rainfall. Sodium arsenite is poisonous to livestock and should not be used in areas where animals have access to recently treated areas. After the rains have leached the poison material into the soil there appears to be little hazard from this source. (In the absence of data on this point it is recommended that pasturing be delayed until the treated area has been exposed through the winter season.)

The 2,4-D compounds are not as effective on gorse as on many other plants. They should not be used on large gorse but on occasions can be used effectively on smaller plants. The ester compounds appear to be much more effective than the salts. When the ester forms of 2,4-D are applied to gorse regrowth the plants may not be killed but, on the other hand, they will make little growth. Certain areas which have been treated in this way for three years show approximately 50 per cent reduction in stand and a total regrowth of seldom over four to six inches. Adjacent untreated areas average from thirty-six to forty-eight inches in height. It appears likely that 2,4-D could be used effectively as the treatment to follow Ammate or sodium arsenite. This would destroy seedlings and keep existing live plants under control. The principal advantages of this practice are: (1) The cost of material is considerably less, and (2) the 2,4-D does not injure grasses.

There are many chemicals which cause rapid destruction of the top growth but do not destroy the roots; consequently, the plants often recover rather rapidly. It is highly probable that certain modifications of existing recommendations can be made so that new combinations of chemical materials can be used. Experiments now in progress indicate this possibility.

GORSE CONTROL ON TILLABLE LAND

Crop Land.

On land which can be cultivated the removal of gorse by bulldozing is the first operation. The gorse can be bulldozed in windrows and burned at an opportune time. It is important to get as many roots removed as possible as new plants propagate readily from these old roots. On land which can be cropped each year the 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 will give an opportunity to eliminate such old plants as may be left and will destroy large numbers of seedlings. The tillage practices will expose large numbers of seeds which have been 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 three hundred pounds of superphosphate per acre while the seedbed is being prepared. It is usually helpful also to apply about one hundred pounds of ammonium sulfate or equivalent nitrogen fertilizer. 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. The lush growth of pasture under these conditions tends to discourage re-establishment of gorse. In the event of individual plants becoming established, these can be controlled readily by spot treatment with Ammate. A little time spent with a portable knapsack sprayer will usually control these plants satisfactorily.

On upland plantings where the soil is less fertile and 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 four to six pounds of sub-clover per acre in combination with fifteen to twenty pounds of grass seed is recommended. Sub-clover is the only legume recommended because of its adaptability to good gorse control practices.

Once the pasture is established fertilizing with 200 to 400 pounds of ammonium sulfate per acre is desirable each year. This should be applied partly in the spring and partly in the fall. Gorse, like many other legumes, has difficulty in competing with good grass stands. Once the pasture is established it is necessary to graze closely. Periodic close grazing by sheep appears to be essential to good gorse control under pasture conditions. In these close grazing operations sheep will eat the gorse seedlings readily and destroy most of them. Close grazing also stimulates the growth of sub-clover and when this plant becomes well established it is possible to reduce the nitrogen fertilization. If the grazing is not sufficient to graze the pasture uniformly throughout then it should be mowed periodically and the clippings removed from the field if they are heavy.

Under certain conditions there may be a considerable infestation of gorse seedlings. In this event the pasture should be sprayed in August after the sub-clover has gone to seed. The ester form of 2,4-D applied at the rate of three pounds of parent acid per acre will kill most of the gorse seedlings. This application will not injure the grass nor will it affect the sub-clover seed.

It should be emphasized that during the first few years, in pasture establishment particularly, it is necessary to watch the pasture closely and to observe the recommendations that have been made. A combination of a dense sod, close grazing with sheep and spraying with 2,4-D will make it possible to establish an excellent pasture and to control gorse satisfactorily.

The Use of Goats.

There are many areas of gorse infestation where it is not possible or economically feasible to clear the land and to establish improved pastures. Under these conditions the use of goats offers an economical and practical method.

In preparing the land for use by goats the gorse should be burned. The burning should be done or attempted only when the stand of gorse is dense, when it has reached a height of from four to six feet, and when the relative humidity is low (50 per cent or less). Then it is necessary to provide a good fence. Goats are curious animals which often appear to resent being confined to a given area. Any attempt to confine goats with anything but a first-class fence is likely to be unsuccessful. The goats should be confined in the area when the regrowth from the crowns or from seedlings is from two to four inches in height. At this stage the vegetation is soft and palatable and is relished by both goats and sheep. Goats prefer a considerable amount of browse in their diet and they will often eat relatively large gorse even when there is plenty of grass available. In the coastal region of Oregon 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 two 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 have been destroyed per acre and from ten to thirty 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. However, as the gorse is reduced the amount of grass can be increased, so that an area which was once practically useless for forage production can be converted to one producing appreciable amounts of pasture for both goats and sheep.

CONTROL BY REFORESTATION

Experience in Europe and observation of various areas in Oregon indicate clearly that gorse can be controlled when it is subjected to heavy shade. The difficulty in Oregon has been that in the principal areas of heaviest infestation numerous fires have destroyed practically all possibility of natural reforestation. It is believed that under certain conditions there is a possibility of burning gorse and planting the land to trees and eventually getting control of the gorse by the trees themselves. The State Forestry Department has some experiments in this connection now under way. If trees are to be an effective agent in controlling gorse then it will be necessary to provide suitable fire protection for planted areas. This can be done most effectively

by using chemicals to develop fire breaks around the areas. An annual treatment of Ammate, sodium arsenite, or even 2,4-D would provide adequate protection. Obviously the use of trees in gorse control is a long-time project. It is estimated that some 20 to 25 years will be necessary to control gorse in this way. As much of the gorse-infested area is most suitable for timber production, this will be an important factor in the ultimate control of the weed.

GENERAL OBSERVATIONS

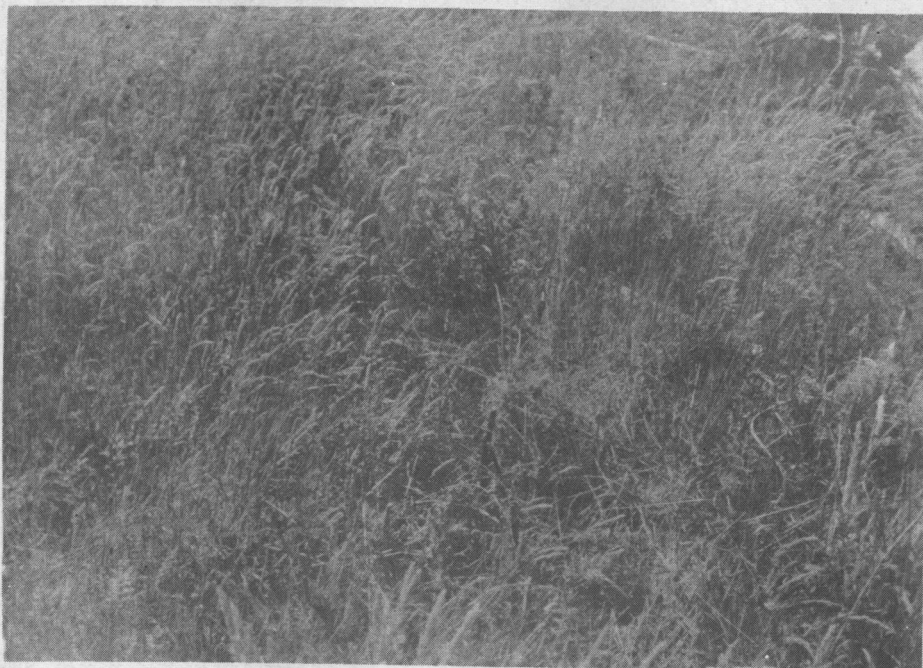
It should be emphasized that there is no easy method of gorse control. Vigorous plant growth, long life of the many hard seeds produced, and adaptation to rather unfavorable conditions for other plant growth all tend to make this a difficult problem. It is felt that with information now available a rather sound control program for certain gorse-infested areas can be developed.

One of the principal needs in any gorse control program is to establish in the mind of the general public the seriousness of this pest. Because of the relatively slow spread in the years following the initial establishment many feel that the pest is of little consequence. This attitude is highly dangerous.

The best time to control gorse is when it becomes first established in any area. Gorse can be controlled with materials and methods now available but it requires constant and diligent application on the part of the individuals concerned. In the case of extensive infestations, the cooperation of private and public agencies will be required to develop a sound program.



Ammate applied to regrowth after complete burn at 3 lbs. per square rod in 1946 and 1947. The 1948 application was at 1.5 lbs. per square rod. All plants are dead and grass is becoming established.



Sodium arsenite at 2 lbs. and borax at 6 lbs. per square rod in May 1947 gave almost a complete kill by 1948. Heavy stand of grass appeared about one year after original treatment. Grass re-establishment following arsenic usually requires a longer period.



Port Orford cedar 18 months after planting. This area had been treated with Ammate after a burn to retard the growth of gorse.



Young pine growing in dense gorse 18 months after planting. This area had not been treated with chemicals following the burn. A good forest stand will eventually kill gorse by shading.



Gorse infestation on W. J. Sweet ranch, Curry county. This was burned in 1944. Area to left of fence has been pastured with goats, area to the right has not.



Close-up of steep hillside just below area shown above. Note the heavy infestation of grass and dead gorse as a result of careful grazing with goats.