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CHEMICAL FIREBREAKS

By G. A. PEARCE, M.Sc.(Agric.), Biological Services Division

MANY public bodies are making regular use of herbicides to create firebreaks. In Western Australia more than \$200,000 is being spent on chemicals each year to protect property from fire. In many situations where the buildings and property are of great value, the cost of the chemical becomes insignificant.

For farmers, chemical firebreaks around yards, sheds, houses and feed stores are economical but for the extensive areas needed for paddock breaks they are not. The average farm has about 7 to 14 miles of firebreaks, making a total for the State of some 150,000 miles. The cost for cultivation is thought to be around \$5 per mile where the farmer makes his own firebreaks. Contract prices are nearer \$20 per mile.

The types of weeds present will largely determine the most practical method of control.

Plants classified as *annuals* are those which complete their life cycle from seed in less than one year. Usually they are easy to kill but because of abundant seed production they are very persistent. A *biennial* lives for one year but less than two. Very few weeds fall into this category. A *perennial* is one which lives for more than two years and may live indefinitely. Where perennial weeds are present these should be treated independently. This may be done by a mechanical or chemical treatment.

Advantages of chemicals

In many situations it is not possible to use cultivation to make a firebreak. Around buildings and yards, along fencelines or on industrial sites, there is little space to manoeuvre tractors and implements. Once the soil is cultivated dust is often a problem, whereas a bare consolidated surface is relatively stable.

The continual cultivation of the same strip, year after year, particularly on sloping ground, is often the cause of erosion and the formation of gullies.

In these situations the use of chemicals should be considered, but it must be remembered that cultivation, where possible, is cheaper than a spray treatment.

Danger to trees and shrubs

Although the herbicides mentioned in this article are not toxic to humans or animals, they are harmful to all vegetation, and care must be taken to prevent the spray from drifting onto garden plants. Damage can also be caused by the roots of trees and shrubs, growing under treated



Weed control here would have protected this post from fire and given the motorist a clear view

areas, absorbing the herbicides. Some chemicals are extremely safe while others invariably cause this latter type of damage.

Gramoxone, Reglone and Weedazol TL are safe at any rate of application provided the spray does not contact the foliage. Hyvar, Erase and Steriweed should never be used adjacent to garden plants, while the other products can be used at low rates of application.

Importance of soil types

Where the area to be treated is a fairly light sandy soil it is difficult to keep a residual herbicide in the top one or two inches of soil. Any rain will gradually move the chemical down through the soil past the root zone so that shallow rooted annual weeds are often able to persist even a few weeks after treatment. With a heavier soil type the trouble does not occur, as the chemical is fixed to the clay particles or organic matter and remains fairly close to the surface.

Some herbicides are more persistent than others and also there is variation in the manner in which they move in the soil. For this reason the characteristics of each particular herbicide should be understood.

Removal of dry surface soil by wind is another problem, as herbicide applied to a dry surface may be removed with the surface soil particles. For this reason, if a residual effect is required, it is best to apply the spray to a moist soil and at a

time when rain can be expected. If the surface is dry, rain is desirable within a few days of the herbicide application.

Industrial weed control

Industrial weed control is usually undertaken where expensive equipment and valuable property must be protected and the area of ground to be treated is relatively small. For these reasons the cost of the chemical used is not important when compared with the value of the property and the cost of labour for application. Under these conditions higher rates of application of the herbicides are recommended to ensure good control.

Perennial plants such as scrub or perennial grasses must be treated individually, depending on the species involved. Perennials should be eradicated while annuals can be treated each year, ensuring complete control for the growing season. Table 1 lists the products recommended for industrial weed control.

Firebreaks

Although there are numerous areas where farmers and other landowners might prefer to use chemicals rather than cultivation, the deciding factor is usually the cost of the treatment. Although a higher cost may be warranted for special purposes it is generally felt that for firebreaks the cost of herbicidal treatment must be close to that of cultivation.

Spraying six weeks after the break of the season is the most economic method of establishing a firebreak



Table 1.—Treatments recommended for creating firebreaks around buildings and plant.
The rates suggested are higher than for general firebreaks

Weeds	Time to Spray	Herbicides Listed in order of preference in each section	Rate per Acre	Gallons of Water per Acre (minimum)	Cost per Acre (1 mile x 8 feet)	Comments
Annuals (grasses and broadleaved weeds)	June-July	Vorox AA	8 lb.	40	\$38.00	Small weeds killed and bare surface maintained for 6-8 months
		Hyvar X	5 lb.	40	\$38.00	
		Steriweed	15 lb.	40	\$48.00	
		Erase	220 lb.	....	\$75.00
	August-September	Gramoxone plus Reglone	2 pints + 2 pints	100	\$15.00	2 pints wetting agent per 100 gals. re- quired Burn when dry
		Vorox AA	10 lb.		\$47.00	
		Hyvar X	6 lb.	100	\$45.00	
		Steriweed	20 lb.	100	\$60.00	
Couch, Kikuyu	October-April	2, 2 D.P.A.	40 lb.	100	\$26.00	Spray regrowth as it appears Weedazol TL is very safe near trees and shrubs
		Weedazol Total	25 lb.	100	\$41.00	
		Weedazol TL	4 gals.	100	\$45.00	
	May-September	Hyvar X	8 lb.	100	\$60.00	Do not apply Hyvar near trees and shrubs
Paspalum	First step February- March	2, 2, D.P.A. or Weedazol Total	50 lb. 30 lb.	150 150	\$33.00 \$49.00	3 pints wetting agent per 150 gals. should be used
		Hyvar X	20 lb.	150	\$150.00	
	Second step Burn May, Spray June	Hyvar X	20 lb.	150	\$150.00	Regrowth will occur after each treat- ment Do not apply Hyvar near trees and shrubs
	Third step September - Feb- ruary	2, 2 D.P.A. or Weedazol Total	50 lb. 30 lb.	150	\$33.00 \$49.00	
		Weedazol TL	4 gals.	150	\$45.00	
Water Couch	December, repeat in February	Weedazol TL	4 gals.	150	\$45.00	Two sprays required

Guarding valuable property from the risk of fire is made easy by the proper use of herbicides

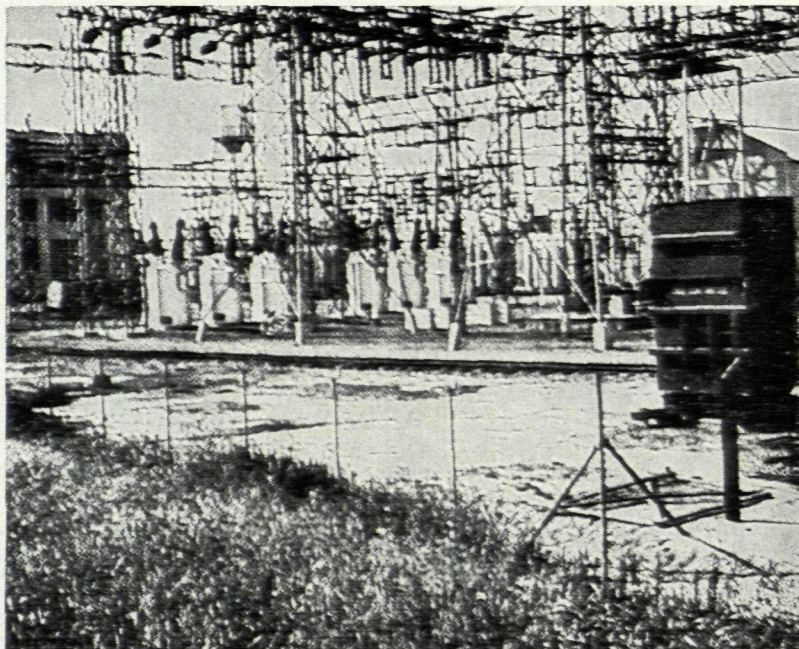


Table 2 lists the treatments recommended for making simple firebreaks. The cheapest treatments are those applied early in the winter.

Applying herbicides

When herbicides are applied for weed control it is important to wet the foliage thoroughly, and although low volume spraying is satisfactory on small weeds, it is highly desirable to increase the amount of water used as the weeds become larger. Very often an increase in the quantity of water used will prove just as effective as applying more herbicide.

Once a weed stand becomes more than a few inches high, it often happens that some leaves are protected from the spray and these survive the treatment. For this reason the volumes of application shown in the Tables should be used.

Practically all the chemicals mentioned are wettable powders and agitation is therefore required to keep them in suspension.

Early winter treatments

The most economical method of establishing a firebreak with herbicides, where annuals are the main vegetation, is by an early winter treatment, within four weeks

of germination. At this time the weeds are still small and easily killed, and the herbicide is applied to the soil surface and thus will remain and kill new weeds as they germinate.

Spring treatment

Weeds can be just as readily controlled with spring applications as with earlier treatments, but the rates used must be increased, so treatment is more costly. Also, unless the spray is applied early enough, the dead material must be burnt to obtain a bare surface.

The one advantage to be gained by delaying the treatment is that there is no need for a residual herbicide to be used, but this saving is more than offset by the increased rate of application required.

Herbicides

Weed-killing chemicals are called herbicides. A *contact herbicide* is one which only kills the plant parts to which it is applied. A *residual herbicide* is one which, once applied, remains in the soil for varying lengths of time and kills the weeds as they germinate.

Vorox AA

Vorox AA is an equal mixture of amitrole (40 per cent.) and atrazine (40 per cent.).

The amitrole kills the established weeds while the atrazine remains in the soil and kills seeds as they germinate. It can be applied any time during the growing season but the rate of application and volume of application should be increased as the plants become larger.

Weedazol Total

Weedazol Total contains 2,2 D.P.A. (57 per cent.) and amitrole (10 per cent.). Both ingredients are effective against grasses and the mixture is used for the control of perennial grasses.

Erase

Erase contains boron trioxide (40 per cent), DPA (3.7 per cent.) and 2,4-D sodium salt (2.0 per cent.). Boron compounds have an extremely long residual effect while DPA is a leaf-absorbed grass weed herbicide. For this reason Erase remains effective for several years. However, its cost precludes its use on most situations.

Gramoxone and Reglone

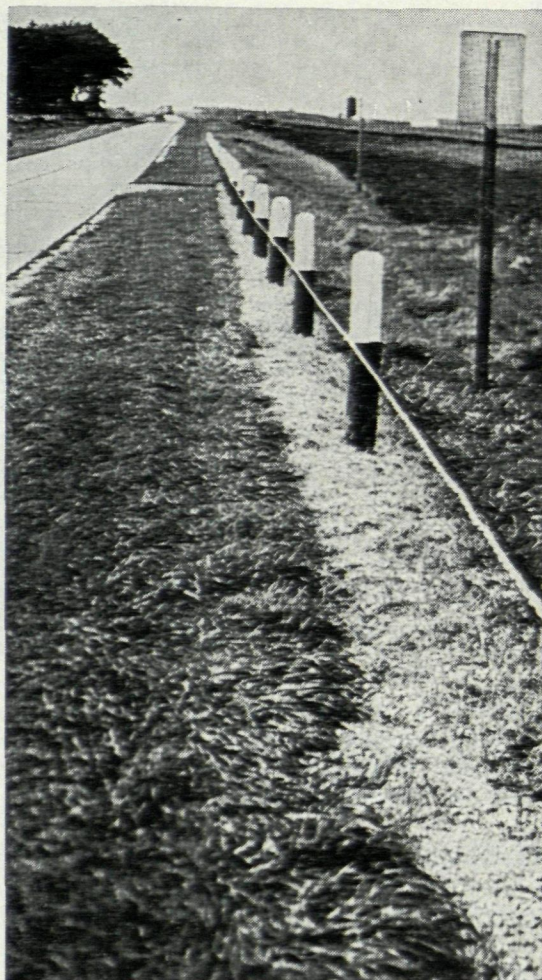
Gramoxone, which contains paraquat and Reglone, which contains diquat, are related materials and both are quick acting, contact herbicides which have no residual effect. For this reason they should only be used when there is little likelihood of further weed emergence.

Their lack of residual effect can be overcome by combining them with a residual herbicide, such as diuron, which will remain in the soil and kill the weed seeds as they germinate. Wetting agent at the rate of 2 pints per 100 gallons should be added to the spray mixture.

Diquat is mainly effective against broad-leaved weeds, while paraquat is used for grasses. Where both types of weeds are present the two sprays can be combined. For either broadleaved weeds or grasses by themselves, only the appropriate spray should be used; this will reduce the cost of the treatment.

Hyvar X

Bromacil, the active ingredient of Hyvar X is an extremely effective general herbicide for use where bare ground is required. It is particularly effective against perennial grasses but because of its activity



Treating a narrow strip, such as shown here, with a herbicide early in the year is relatively cheap and all growth is prevented for the year

against woody plants it must be used with care. Where the roots of trees and shrubs extend into the area to be treated, Hyvar should not be used. The high cost of this material often precludes its use.

Karmex and Primatol A

The very low solubility of Karmex and Primatol A enables these herbicides to remain in the top few inches of soil and kill weeds as they germinate. The low rates recommended will be effective against annual weeds and even in sandy soils will keep the surface bare for the winter period. They are not very effective against established weeds at low rates of application and for this reason other herbicides are often added.

Gramoxone plus Karmex gives a knock-down and residual effect, while amitrole is added to atrazine to obtain the same effect. This latter mixture is the basis of the trade line Vorox AA.

Steriweed

Steriweed contains 5 per cent. 2,4-D, which is effective against broadleaved seedlings, 15 per cent. 2,2 D.P.A. which is used for the control of grasses, and 30 per cent. diuron, which has a residual effect on germinating seeds. Thus it is a well balanced combination spray suitable for most situations, providing it is applied while the weeds are small.

2,2 D.P.A.

2,2 D.P.A. is a selective grass weed killer which is mainly absorbed through the leaves. Wetting agent should be added to the solution to help the chemical stick to the leaf. It is particularly effective against couch and kikuyu but not entirely satisfactory for paspalum. It has little residual effect and should be applied during the growing season. A second treatment is often required to control regrowth and dormant roots. Its low cost makes it the obvious chemical to use for grass weed control even where repeated treatments are required.

Table 2.—Treatments recommended for creating firebreaks where only annual weeds occur. One acre equals one mile by 8 feet

Time to Spray	Herbicides Listed in order of preference	Rate and Cost per Acre				Minimum Volume Recommended	Comments
		Rainfall below 20 in.		Rainfall over 20 in.			
		Rate	Cost	Rate	Cost		
May	Karmex	2 lb.	\$7.50	3 lb.	\$11.25	10 gals.	Ensure chemical is applied evenly to moist soil
	Primatol A	2 lb.	\$11.20	3 lb.	\$16.80		
Mid May to Mid June	Vorox AA plus	1 lb.	Total	2 lb.	Total	40 gals.	Not recommended for areas with more than 30 in. rainfall
	2, 4 D sodium plus	1 lb.	\$6.65	2 lb.	\$12.00		
	2, 2 D.P.A.	2 lb.	....	2 lb.	....	
Mid May to July	Vorox AA	3 lb.	\$14.00	4 lb.	\$18.80	40 gals.	
	Hyvar X....	2 lb.	\$15.00	4 lb.	\$30.50		
July	Gramoxone plus	1 pint	Total	Not recommended		100 gals.	No residual effect but later germination unlikely
	Reglone plus	1 pint	\$6.50				
	wetting agent	1 pint	....			
August-Mid September	Gramoxone plus	1½ pints	Total	2 pints	Total	100 gals.	
	Reglone	1½ pints	\$11.55	2 pints	\$15.00		
	plus wetting agent	2 pints	....	2 pints	....	
	Vorox AA	6 lb.	\$28.00	8 lb.	\$37.00		
	Hyvar X....	4 lb.	\$30.00	5 lb.	\$37.50		
Mid September-October	Gramoxone plus	2 pints	Total	2 pints	Total	150 gals.	Burn when dry before end of growing season
	Reglone plus	2 pints	\$14.25	2 pints	\$14.25		
	wetting agent	3 pints	....	3 pints	....	

Weedazol TL

Weedazol TL contains amitrole, an extremely effective herbicide on both grasses and broadleaved weeds. It does not have any residual effect and is therefore often used in conjunction with other herbicides for firebreak work. With perennial grasses it is absorbed through the leaf and can be used in situations where trees and shrubs have their roots growing below the sprayed area.

Summer rainfall areas (Kimberley and North West)

The high temperatures in the Kimberley and North West areas cause most of the chemicals to break down and the residual effect is lost. Hyvar X is very stable under these conditions and has proved outstanding for the control of all vegetation. Six pounds per acre is recommended in a minimum of 50 gallons of water applied at the beginning of the wet season. Where trees and ornamentals are present Hyvar X should not be used.

Table 3.—The herbicides, trade names, distributors and cost of the products mentioned in this article

Herbicide (Trade Name)	Active Ingredient	Distributor	Cost
Vorox AA	Amitrole 40% plus Atrazine 40%	Barrow Linton-Western Livestock	\$4.70 per lb.
Weedazol Total	Amitrole 10% plus 2, 2 D.P.A. 57%	Barrow Linton-Western Livestock	\$1.64 per lb.
Erase	Boron Trioxide 40% D.P.A. 3.7% 2, 4-D sodium salt 2%	Barrow Linton-Western Livestock	34c per lb.
Gramoxone	Paraquat 20%	Elders G.M. Westralian Farmers Dalgetys	\$30.00 per gal.
Hyvar X	Bromacil 20%	David Gray Amalgamated Chemicals Shell Chemical	\$7.50 per lb.
Karmex	Diuron 80%	David Gray Amalgamated Chemicals Shell Chemical	\$3.65 per lb.
Primatol A	Atrazine 80%	Barrow Linton-Western Livestock	\$5.60 per lb.
Reglone	Diquat 20%	Elders G.M. Westralian Farmers Dalgetys	\$24.90 per gal.
Steriweed	Diuron 30% 2, 2, D.P.A. 15% 2, 4-D 5%	Elders G.M. Westralian Farmers Dalgetys	\$3.00 per lb.
various	2, 2 D.P.A.	Agricultural chemical firms	approx. 65c per lb.
2, 4-D sodium	2, 4-D sodium salt 85%	Chemical Industries	65c per lb.
Weedazol TL	Amitrole 25%	Barrow Linton-Western Livestock	\$11.20 per gal.
wetting agents	various	Agricultural chemical firms	approx. \$5 per gal.

Obituary

MR. KEVIN NEEDHAM

Many people in the dairying industry will share the deep regret of his fellow officers on the sudden passing of Mr. Kevin Needham, Assistant Chief of the Department's Division of Dairying.

Mr. Needham started a tour of duty in the South West on March 17. He took ill and on March 20 was admitted to Denmark Hospital where he died on Wednesday, March 26, aged 49.

He had been promoted to Assistant Chief of the Division in December, 1968, after 31 years with the Department.

Mr. Needham was a highly respected officer who had served the dairying industry well and had greatly helped the advancement of the State's dairy products manufacturing.

In 1937 he joined the Department as a cadet and after graduating from the W.A. University in 1940 he spent a year as an agricultural adviser in Perth before going to Narrogin where he advised in dairying, pig husbandry and dairy products manufacture.

From 1942, he was Officer-in-Charge of the Department's Dairy Products Laboratory for ten years and was then district adviser at Busselton for three years. He was promoted back to Perth in 1955 as dairy cattle and pig husbandry officer and in 1960 was appointed Officer-in-Charge of Dairy Products Supervision.

As well as his work on dairy production techniques, Mr. Needham conducted research into seasonal variation in the composition of milk and the detection of anti-biotic residues in milk and, in co-operation with the Department's Animal Division, into the effects of mastitis on the composition and yield of milk.

Mr. Needham was the second son of the late Senator Edward (Teddy) Needham who was leader of the Senate Opposition from 1926 to 1929, general secretary of the A.L.P. State Executive for four years and whose career in State and Federal Parliament covered a span from 1904 to 1953.

Mr. Kevin Needham leaves a widow, three daughters, one of whom is married, and a son.

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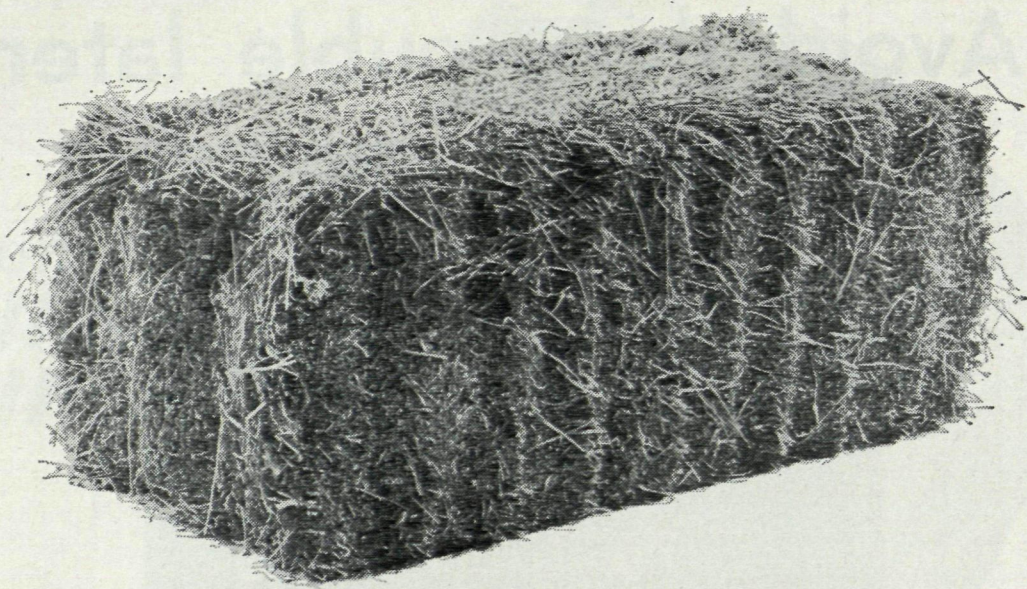


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