PROTECT

No. 8

THE OFFICIAL JOURNAL OF THE INSTITUTE OF NOXIOUS PLANTS OFFICERS INCORPORATED

Double Trouble for Ragwort

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Contents

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Stan Dulieu P.O. Box 431 - TAUPO

SUBSCRIPTIONS

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CATERPILLARS ATTACK Molesworth Station

AS REPORTED IN THE MARLBOROUGH EXPRESS

"EAT YOUR LITTLE HEARTS OUT!" could well have been the message given to more than 7000 caterpillars by the former Molesworth Station supervisor, Mr M.M. Chisholm. He had, in fact, been awaiting their arrival for three years.

And it is not that they are something special. It's just that they gobble up ragwort like a mob of starved sheep let loose in a paddock of Southland swedes.

They are cinnabar caterpillars, bred in the Wairarapa where they have virtually cleaned up ragwort infestations.

Working through Mr N.A. Woodley, Featherston County Council's Noxious Plants Officer, and a former hand at Molesworth, Mr Rod Thompson (now manager at Greentops Station in that area), a consignment of cinnabar caterpillars was flown to Blenheim toward the end of January.

They were "caged" in three large plastic buckets and by the time they arrived had consumed most of their host ragwort foliage and were starting into the stalks. That same day Mr Chisholm flew the caterpillars out to the Clarence block where ragwort is starting to flourish.

Why the Clarence? According to Mr Chisholm, there are no sheep in the Clarence which means that the ragwort infestation is potentially dangerous.

EVEN CHANCE

With ragwort fairly extensive and widespread in Marlborough, the Molesworth experiment will be watched with interest. The environment, for a start, is totally different to that of the Wairarapa. The caterpillars were liberated at 885m (2900ft) above sea level, far higher than their natural european (and Wairarapa) habitat, and the climate is much colder. However, Mr Chisholm does believe they will strike an even chance of success.

The cinnabar moth is a native of the United Kingdom, Europe and West Asia. Both the moth and the caterpillar are very conspicuously coloured. The moth has a black body, the front wings are blackish with a crimson stripe and two crimson spots, while the hind wings are ringed with yellow and black.

Liberation in the field in New Zealand began in 1929 when more than 3,000,000

eggs were distributed. Spasmodically up until 1972 moths were taken to Masterton, Carterton, Featherston and Lake Wairarapa areas.

The biological control of ragwort goes back to 1927 when it was inaugurated by the Cawthron Institute in Nelson.

The first moths can appear as early as August but they become more abundant in September and October and increase to maximum numbers during the summer months. The female lays between 90 to 265 eggs on the undersurfaces of the leaves. Many of the eggs are often infertile. Sudden fluctuations in temperatures cause a high mortality rate with hatching caterpillars. Again according to weather and the season the hatching period can vary from a minimum of eight days in December, 18 days in spring, and 28 days in autumn. Caterpillars are most numerous in December, January and February.

Mr Woodley says that feeding can last from 26-54 days, depending on the temperature. At their greatest abundancy the caterpillars play havoc with ragwort and in fact some places have as many as 100 caterpillars per plant.

When fully fed they wander about looking for pupation sites- under logs or old fence posts.

The seasons 1969 to 1974 in the Wairarapa saw an abundance of the cinnabar caterpillars, and proved that the climate then was most favourable for the insect and allowed a population buildup. During the 1975 to 1977 seasons there was a decline in populations because of unsuitable climate.

But the present season has shown an abundance of caterpillars and they have controlled thousands of acres infested with ragwort.

Mr Chisholm expects the same fluctuations at Molesworth, though he has yet to make a detailed study of the cinnabars' progress there.

CHEAPER

A major reason for biological control was the economic impossibility to cope with big infestations (not only on the station) with spraying programmes.

Mr Chisholm said they had been trying to control ragwort for 12 to 15 years with chemical hand application, but with the prevailing winds from infested areas outside the boundaries of the property, they found it impossible to make headway with chemical and aerial control.

Another difficulty now is that with two power transmission lines up the Clarence it was not easy to get to the infestations from the air.

Earlier this century ragwort caused the deaths of horses and cattle. (The alkaloid jacobine is the toxin). Sheep were more resistant and are now being used to control or reduce ragwort stands.

Mr Chisholm said he knew of no stock losses at Molesworth attributable to ragwort. "However," he said, "it's a weed, and I hate weeds."■

THE NEW LAW ON Noxious Plants

B.E. ELLIOTT

Honours Student in the Faculty of Law

VICTORIA UNIVERSITY - WELLINGTON

IN AUGUST last year, Parliament passed a new law on noxious plants- the Noxious Plants Act 1978. This act follows the 1973 report of the committee of inquiry and has, since April 1, replaced previously existing laws on the topic.

Although the Noxious Weeds Act 1950 and the Nassella Tussock Act 1947 are both repealed, the Nassella Tussock Act will continue in essentially the same form, as Part II of the new act. Eventually this second part will be repealed and the functions of the Nassella Tussock Boards will be performed by District Noxious Plants Authorities under Part I of the act.

The general object of the new act is to make better provision for the control of noxious plants; this is to be achieved largely by a restructuring of the administrative organisation, with the intention of producing a more centralised policy which can be carried out with a maximum of co-ordination and efficiency throughout the country.

The new administrative authorities are given wider powers of inspection than existed under the old legislation and the maximum penalties for an offence have been substantially increased.

Greater provision is made for the protection of the rights of the occupiers of land, and the all-encompassing nature of the new legislation is reflected in the fact that Crown land is now subject to noxious palnts legislation. Although the new act is larger than the old ones, the greater part of it is principally devoted to providing for administrative organisation.

STRUCTURE

To achieve a nationally co-ordinated eradication effort, a hierarchical structure has been set up. This has the National Plants Council at its head, Regional

Co-ordinating Committees at the next level, and District Noxious Plants Authorities at the bottom.

The National Plants Council consists of 10 members- representing farmers, city and county councils, and various Government departments. Essentially, the council oversees the administration of noxious plants eradication and control for the whole of New Zealand. As part of this function it will develop a national policy and will direct co-ordinated efforts to implement that policy. It will also train Noxious Plants Officers and advise the Ministry of Agriculture and Fisheries.

The Regional Co-ordinating Committees consist of representatives from the District Authorities in the particular region, as well as farmer representatives, a representative of the Department of Lands and Survey, and an advisory Officer from the Ministry of Agriculture and Fisheries. There is also provision for a representative in respect of Maori land in any region.

These committees will provide a link between the council and the District Authorities, ensuring that eradication and control are implemented on a co-ordinated basis in a particular region.

Although farmers will obviously be affected by the activities of the National Council and the Regional Committees, it is with the District Noxious Plants Authorities that they will be more directly involved. Administratively, there is very little change in this area from the old system. The District Noxious Plants Authorities are simply local authorities wearing a new title in respect of their functions under the new act. So, the local authorities will continue to administer the legislation at the "grass-roots" level in much the same way as they did before.

The new act differs from the old in respect of the classification of noxious plants. There is now two classes- Class A, and Class B. Class A plants are those that are declared by the Ministry of Agriculture and Fisheries with the agreement of the Minister of Finance and on the recommendation of the Noxious Plants Council. Regard is given to the seriously adverse effect of the plant on the land, and the cost and practicability of implementing an eradication programme.

The full cost of the eradication of Class A noxious plants will be met by the Government, and the actual process of extermination is to be carried out by the M.A.F. with the co-operation of the occupiers of the affected land.

RESPONSIBILITY

Class B noxious plants are those that the Noxious Plants Council will declare for a particular area. The cost of and responsibility for eradicating Class B noxious plants will be borne by the occupier of the affected land, although there is provision for assistance in some cases.

The activities of the District Authorities and Noxious Plants Officers are very similar to those performed under the old law. One of the significant changes is

the widening of the inspection powers of Noxious Plants Officers. Not only do they have power to inspect land for noxious plants, but they can inspect premises, equipment and machinery.

The Noxious Plants Council can also prohibit the transportation or movement of virtually anything that is capable of dispersing noxious plants or their seeds. Among other things, this includes vehicles, crops, machines, topsoil and shingle, and livestock. However, the protective provisions are also widened.

Where practicable, before entering a property, or if requested to do so by an occupier, a Noxious Plants Officer must produce his warrant of appointment or other evidence of his authority. An Officer must also give an occupier 24 hour's notice before taking any action on any land where an occupier has failed to comply with a notice to eradicate Class B noxious plants.

ARBITRATOR

On receipt of a notice requiring him to control or eradicate Class B noxious plants, an occupier may appeal in writing against the notice within 14 days. The written appeal is sent to the District Authority, together with a $10 fee. The District Authority can attach a report, if it wishes, and must then refer the appeal to an independant arbitrator.

The arbitrator will be a barrister or solicitor in the particular region, who will hear the appeal and can then affirm, cancel, or vary the notice. The new appeal procedure is intended to operate quickly while, at the same time, being seen to be fairer to the occupier concerned than the old system.

Where a road adjoins a property, the boundary is deemed to extend to the middle line of the road, so that the adjoining occupier is responsible for the control of noxious plants within that extended boundary.

The penalties under the new law are substantially increased. For offences relating to Class A noxious plants, the maximum penalty is a fine of $5,000, or $200 for every day that the offence continues. For Class B noxious plants, the maximum is a fine of $2,000 or $150 for every day that the offence continues. For lesser offences, the maximum is $1,000 or $50 for every day that the offence continues.

DETERMINATION

The Noxious Plants Act 1978 evidences a renewed determination to effectively combat and control the spread of noxious plants, and provides a more streamlined system to further that aim. However, insofar as it affects the average farmer, the new legislation is unlikely to make a significantly greater impact than the old legislation. Further, although the powers of inspection are widened, the procedure for inspection and for the issuing of notices to clear noxious plants are much the same as before.

There is a significant difference in the classification of noxious plants with the Government shouldering the responsibilty and cost for the eradication of Class A noxious plants. Against this must be balanced the realisation that the

number of plants included in this category is likely to be extremely limited. As a result, since most plants that were classified as noxious weeds are likely to become Class B noxious plants, the major responsibility for eradication and control will continue to remain with the occupiers of the land.

The act came into force on April 1 this year. For six months after that the old law will continue in force for any plants that were noxious weeds but which have not been classified under the new legislation. ■

☆

HOVER-SPRAYING SUCCEEDS

Pre-emergence spraying of weeds is often impracticable because the land may be too wet to carry spray equipment. Or if spraying can be done the damage caused by wheel marks may be unacceptable. Aerial spraying is an alternative but is usually not accurate enough, or is too expensive.

A solution was suggested long ago in the early days of the development of the hovercraft. But this did not come to anything because of the disturbance to the spray caused by the hovercraft's air-blast, and by the difficulty of steering a cushion vehicle to an accurate spray pattern.

Now the Centre for Overseas Pest Research in Britain appears to have solved these problems. They have fitted to a hovercraft a light wheeled undercarriage which provides precise steering without making damaging wheel tracks. The spray is delivered, from a forward mounted boom, by controlled droplet application (CDA), a system which has been around for some time. It uses spinning jets powered by electricity, to spin off droplets of uniform size. The size of the droplets can be controlled by spin speed and flow rate of the liquid.

With this system a sufficiently accurate and even distribution of the chemical by hovercraft can be achieved. (As reported in NZ Farmer- 28/12/78) ■

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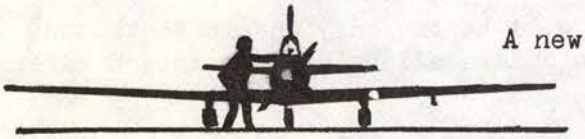
AFTER THE FARM BIKE- THE FARM PLANE?



A new, cheap, ultra-light, single-seat aircraft developed in the US may tempt progressive hill country farmers who want to move fast over their stations. It is the Birdman TL-1A, which is on sale, as a kitset, for only $1800.

It has an 11.5 hp two-stroke engine, and weighs only 122lb (55kg) empty. The wing span is 10.7m; and it needs only 23m to take off, and just over 9m to land. The stall speed is 22 km/hr. The report does not give the range on a full tank, or list any defects, but is titled "Cheaper to fly than to drive."

(As reported in the NZ Farmer- 8/2/79) ■

RARE NATIVE BROOM SPECIES FOUND

MARLBOROUGH PRESS

A SMALL STAND OF a species of native broom, now regarded as an endangered species, is growing on Marlborough's east coast near Seddon.

☆ ☆ ☆

The clump of a dozen plants, now bearing their attractive purple flowers, were checked out recently by the Marlborough County Council (Awatere Division) Noxious Plants Officer, Ron Feron.

Concern over the fate of native broom species which are only known to grow in parts of Marlborough in their wild state was voiced last year after the council sprayed some growing in the Waihopai Valley, along with some introduced species.

Mr Feron since claimed that native broom could be found in other inland Marlborough valleys, while it could also be bought in local plant shops and grown in the garden.

Recently he came across a clump of native broom of an unknown species on the coastal bluffs between Station Creek and Blind River. He advised an Otago University professor, Dr J. Child, who was spending the summer recess studying the Marlborough plant life, of the patch, and the assistant Noxious Plants Officer, Mr W. Nicol, accompanied him to the spot, which must be reached on foot through private property.

Specimens of two varieties of broom found there were sent to the D.S.I.R. Botany Division for identification.

A botanist, Mr A.W. Purdie has confirmed that the species are chordospartium stevensonii and carmichaelia ovata.

He advised by letter: "The chordospartium is of particular interest as it is now regarded as being an endangered species, although at one time it was relatively common in certain river valleys of Marlborough.

"Your specimen is of great importance as it will be the only one in the botany division herbarium from a coastal habitat- the others all being from inland river valleys.

"Chordospartium stevensonii can be recognised by the very distinct grooves on the stems and branches, by its size and weeping habit, and by the long compact racemes of lavender-coloured flowers.

"There are now very few specimens of this handsome tree in the wild and large populations are seldom, if ever found. Consequently any new records of its ex-

istence, such as this one, are of the utmost importance."

The area on which the broom grows is Crown land and the Commissioner of Crown Land is being advised.

SPRAYING WITH CHARGED DROPLETS

The idea is to put an electric charge on each spray droplet. Then instead of just falling under gravity the droplet will be attracted to whatever lies in its path and stick there. The concept is not new. But it has recently been developed in the UK.

The University of Sheffield has designed equipment using rotary atomizers to charge droplets of only 50 microns diameter (1 micron is 1000th of a millimetre). Trials at Rothampsted working with barley, beans and sugarbeet as test crops, have shown that, using only 5% of the usual spray volume applied by standard equipment, the new rig can apply 55% more insecticide to the crop leaves. Moreover 20 times more of the spray reached the underside of the leaves than usual. This is of great importance, for example, for aphis control.

Another extremely useful result was that the charged droplets only drifted about 2m downwind from the nozzles, in spite of gusty wind conditions. The university is now looking for manufacturers to develop the equipment commercially.

(NZ FARMER 22/2/79)

WEEDS MAY FEED BETTER THAN CROP

Plant scientists in Minnesota looking at weeds often found in lucerne, and on which a lot of money is spent for control with herbicides, found that in protein and mineral content several weeds were as good, or better, feed than the crop.

Tests were also made to measure the preference of sheep to the different weeds in comparison to lucerne. Interestingly the sheep did not always choose the most nutritious of digestible species. The researchers were also surprised to find that of the 12 common weeds tested nine were as good or better forage than high quality lucerne. Among these were Amaranthus sp. (redroot) Chenopodium sp. (fat hen) and the grasses Phleum sp. and Echinochloa sp.

Thus the conclusion was that farmers should assess the severity of competition by such weeds in their crop, and that if the weeds were not too thick then the expense of herbicide treatment could be avoided.

(NZ FARMER 22/2/79)

HOW TRUE!

- Couples planning marriage should remember that in the word "wedding", 'we' comes before 'I'.
- Nothing is likely to grow faster than a fish between the time he nibbles a worm and the time he gets away.

Booklet 'Clears' Chemical of **BLAME**

MIKE HANNAH
"THE PRESS"

THE FORMULA, 2,4,5-T, could be just another chemical jumble of numbers to most people, but for a scare almost two years ago that linked it with a rash of birth deformities in New Zealand.

The weedkiller, 2,4,5-T, has been used to control brushweeds since the early 1950's. It was also used in Vietnam by United States forces as part of a herbicidal mixture for defoliating, and it was this use that first suggested a link with birth deformities.

An explosion in a chemical factory in a small Italian town of Seveso in 1976 aroused further concern about possible harmful effects of contact with the chemical.

But it was early in 1977 that 2,4,5-T became a household word in New Zealand. Four Taranaki women, who had suffered stillbirths, claimed that the foetal deformities found at birth were caused by contact with the weedkiller.

Arguments ranged to and fro between the women, the Health Department, hospital boards and the manufacturers of the weedkiller, Ivon Watkins-Dow Ltd., until a report in July 1977 cleared the chemical of any link with the deformaties. This subject is covered under a separate heading at the end of this article.

The manufacturers, however, consider that there is still public concern about 2,4,5-T and the TCDD dioxin contaminant, and have issued a booklet for reference purposes aimed at proving the chemical's safety.

"The Status of 2,4,5-T Herbicide and the TCDD Dioxin" sets out to answer the major issues brought up by the controversy in 1977.

The booklet should allay any fears people may still have of contact with 245T. Its references to scientific surveys are balanced, and include studies by the New Zealand Health Department, the United States Council for Agricultural Science and Technology, and the parent company, the Dow Chemical Co.

Perhaps the only criticism that could be made of the booklet is a lack of statistical data. References to "practically no adult and only a small part of the child population" being affected in the Seveso incident are too vague, but these do not detract from the booklet's overall impact.

Set out in a question and answer format, the booklet opens with a chilling comparison of the toxicity of the TCDD dioxin with other well-known poisons. The dioxin is, for instance, 10,000 times more toxic than sodium cyanide, and 200 times more toxic than strychnine. The company makes a telling point when it compares the dioxin with tetanus (which is 10 times more toxic than TCDD) and

the botulinus toxin (which is about 50,000 times more toxic). The later is present in improperly preserved food and widely distributed in soils around the world.

Laboratory tests on rats have failed to show any cancer threat in 2,4,5-T, according to the booklet, while heavy doses of TCDD dioxin were toxic and altered the incidence of cancer. A lower dosage was not associated with any adverse effects.

Figures and statistics would make this statement more convincing, but the booklet goes on to say that "it is the opinion of qualified observers that humans are more tolerant to exposure to 2,4,5-T/TCDD dioxin than many of the test animals used in toxicological tests."

If a pregnant woman were to drink water that had been sprayed with 2,4,5-T, for example, she would have to drink 71,000 litres of water per day over the critical period (the first 28 days) of foetus development to have a 50% chance of producing an offspring with a defect.

Or, if she were to eat blackberries from a bush that had been sprayed, she could eat half a tonne of sprayed berries throughout her pregnancy without any ill effect directly due to the 2,4,5-T or TCDD dioxin content.

But what of direct contact with the spray? The Seveso incident provided an opportunity to observe the effects of direct contact, and, although the population is still being monitored, the worst effect yet found has been a skin disorder, chloracne, which in most cases healed in a short time.

"Most of the initial toxic effect to humans and wildlife observed were characteristic burns on exposed skin, caused by airborne contaminants such as caustic soda, sodium trichlorophenate, and trichlorophenol," says the re

The rate of spontaneous abortions and deformities after the explosion was found to be no different from the rate in a population not exposed to TCDD dioxin.

The manufacturers say there is no substantiated evidence that 2,4,5-T or TCDD dioxin build up in the environment or the food chain.

In a survey in Arkansas and Texas no TCDD dioxin was detected in samples of fish, water, mud, and human milk collected in areas where 2,4,5-T was used over a prolonged period for weed control in rice.

Independant studies of other areas have failed to agree on the amount of 2,4,5-T dioxin that could be detected. The reason undoubtedly lies in the minute amount required to be detected: 10 to 20 parts per trillion.

The long-term effects of TCDD dioxin in the environment have been studied for more than 20 years. In 1972, legal limits were set on the amount of TCDD dioxin contaminant allowed in 2,4,5-T, so for 20 years or more the amount of TCDD dioxin was, in some cases, many times greater than the current level.

"From the widespread use of 2,4,5-T over this prolonged period and the fact

that no major health problems were identified, it is reasonable to conclude that the use of the present product at recommended rates presents no signifant hazard.

The booklet also dismisses any hazard from residue in soils and vegetation and from smoke in burning sprayed gorse. The manufacturers are confident that the Seveso explosion could not be repeated in New Zealand and that the disposal of waste at the New Plymouth plant is safe.

Since 2,4,5-T has been around for more than 20 years, many people may well ask why other herbicides are not used. Ivon Watkins-Dow say that alternative herbicides are non-selective; they leave more residue in the environment; they are more expensive; and they require a more critical timing of application.■

Birth Defects: *'NO LINK'*

As most are aware, 2,4,5-T was linked with two defects of the nervous system: spina bifida (affecting the spinal cord) and anencephaly (a stunting of the brain).

In July 1977, the Health Department released a report drawn up by three independant consultants. They had looked at three "clusters" of these abnormalities in Northland, Taranaki and the Waikato. They concluded that there was no evidence of a link between 2,4,5-T and the birth defects.

Of the seven Northland women who had had abnormal births, only one was found to have had contact with the weedkiller. Two others had a history of spina bifida in their families, and two had undergone drug treatment during their pregnancies that could have affected the foetuses.

Of the five Taranaki women, only one had had possible contact with the spray. One was ruled out from the survey because she had entered the district in her twenty-second week of pregnancy; neither of the nervous defects can occur after the fourth week.

Two other sets of parents were related, suggesting an hereditary condition, and one mother had already delivered a child with spina bifida occulta.

In the eight Waikato cases, none of the mothers had had any contact with 2,4,5-T: all suggested an hereditary condition.■

ANCIENT ADVICE

"Columella, author of De Re Rustica, written in the first century A.D., says:

> 'if these (weeding and sarcling- a kind of hoeing) are neglected, the produce of the fields will be greatly diminished; in my opinion he is a very bad farmer who allows weeds to grow along with corn; for the produce will be greatly lessened if weeding is neglected.'
>
> Adam Dickson, Husbandry of the Ancients- 1788 ■

Beating **GORSE** in Nth. Canterbury

by TONY MOOAR

The integration of several control techniques into one programme by the Forest Research Institute has led to a significant breakthrough in long-term gorse control.

Every method of control has its own group of knockers. Generally, fencing, heavy stocking and fertilizer are regarded as key factors in pasture development from gorse. Which is accepted to mean you have the fences, the money, the gorse at vulnerable stage and the stock to carry through a programme of eradication and control.

The "chemicals only" and line-dozing methods once used in forestry have been criticized on the basis of cost and ineffectiveness over any length of time. Costly they are. And long-term trials in a forestry situation have indicated that the need for re-spraying compounds the cost felony.

In the North Island some detractors have attacked pre-burn spraying as being ineffective in soft sandstone and ash soils, where fertile seeds can lie buried 40-50 cm deep in the soil for 40 years or more.

Similarly, the spraying-burning-cultivation sequence has not always been seen as completely viable mainly because of regrowth following too cool a burn or the raising of deeply buried seeds to the top, highly fertile and sterile soil. V-blading, a common post-burn method of establishing woodlots, also has several disadvantages- the displacement of the topsoil with consequent planting in subsoils, the disturbance of seedbeds and the possibility of creating your own erosion rills.

In the south, burning is the problem. What appears to be the optimum time for burning-off has always co-incided with periods of high temperature and low soil moisture. In each case, the drawbacks peculiar to each control method- be they economic or environmental- are outweighed by the problems inherent in control methods which do not destroy seeds present in the soil and so allow for regrowth.

ECOLOGICAL MANIPULATION

"The key to weed control is really ecological manipulation," says John Balneaves of the Forest Research Institute, Rangiora. "Regardless of how successful weed control can be in physical terms it is justifiable only if the expected

benefits exceed the costs incurred."

With these ideas in mind, in the early 70's, John Balneaves and a group of FRI technicians began a series of tests which had more of the scalpel than the broadsword about them.

Over the past 4-5 years researchers from the Rangiora and Rotorua FRI stations have examined the effectiveness of various regimes, including rotary slashing (to simulate crushing), spraying and pre-burn treatments.

Indications from trials on Mount Thomas, outside Rangiora, showed that there was a clear advantage in slashing then burning, probably because slashing or crushing tends to compact the fuel and reduce the moisture level of the gorse.

DISCING TRIALS

Several disking techniques were also examined, the first being to burn then disk. The presence of large clods of dirt and blackened sticks allowed for only poor pasture establishment with substantial gorse regrowth, so the technique was redirected.

The second technique involved the crushing and disking of green gorse which was then left to dry out and burnt with a very hot fire. So the site was cleared. After a short period gorse regrowth was evident and the plot was doubled disked. This was followed by a further single disking and harrowing in preparation of the seedbed.

The gorse was apparently beaten into submission and the survival of radiata planted reached 95%. All was joy until some 2-3 years after planting when the gorse was back in evidence again.

Regrowth appeared to come from both stools and seed.

The subsequent burn-disk-spray trials were equally ineffective over a period. In this case the failure was because the stools which had been disked up had not been adequately exposed to the spray coverage.

SPRAYING REGIMES

During 1977, John Balneaves ran a series of tests spraying 2,4,5-T/picloram at 10 litres per hectare at different times of the year. Parallel studies of the gorse leaf cuticle had shown that the composition of the outer wax layer actually changed during the year. The implications of such a change were far-reaching. If there was a time when the chemical spray could be better absorbed through the cuticle then it was possible the translocation of the spray throughout the plant could be better effected.

It was hoped to establish a relationship between the stages of growth of the mature gorse plant at the time of spraying and the maximum period of total control which could be expected.

John Balneaves applied 2,4,5-T at 15 litres/ha at various times during the year

and found marked differences between effects.

An assessment scale of the dying off or desiccation was used on a 1 to 5 basis: 1 = healthy gorse, 2 = slightly browning of the upper foliage, 3 = browning of all foliage with all stem tissues remaining green, 4 = the base of the woody stem remains green, 5 = 100% browning of foliage and stem tissue.

After applying 2,4,5-T in June 1975, there was no visable effect in July, 1975. But in August no flowers appeared and this was followed in September by desiccation at score 1, and in October at score 4. By December, desiccation was at 5, with a slight regrowth on the upper half of the stem. This regrowth continued until December 1976, when there was a regrowth from the base to the tip of the old stem.

On the other hand, October proved to be the optimim time for spraying. By December desiccation was at level 5 for both foliage and seed pods, and continued until November 1976. In December of the same year, a slight, weak growth was evident at the base of the old stems.

As a general observation, the October, December and January applications showed a small regrowth from the base of the desiccated stem. This probably suggests an increase in the uptake of chemical and possibily a greater movement within the plant system and, hopefully, a consequent higher mortality rate.

Desiccation and appearance trials for 2,4,5-T/picloram followed a similar pattern. And as John Balneaves points out, the best time for spraying would have to be when flowering has been completed, seed pods were generally well developed and new foliage growth was around 2.5 cm. In North Canterbury this is usually October to December.

NEW CONTROL REGIME

Usually the susceptibility results outlined above, John Balneaves and the FRI group from Rangiora have developed a system of control which works as well in forestry as it does for farming lands. And for a period of up to four years to date. The same system is also applicable to blackberry and broom although at this stage there is no indication of its potency over a similar period.

Where possible a crusher should be used to compact and crush gorse. If crushing is out of the question, a pre-burn spray is recommended. An FRI suggestion is 15 litres/ha of Tordon Brushkiller 520. (However, this will inhibit future clover growth).

Then follow the crushing by a September burn and an October/November spray when regrowth is soft and leafy. Use either 11 litres/ha 2,4,5-T/picloram(Tordon 520 Brushkiller) or 11 litres /ha 2,4,5,-T at 36% plus 5 litres of diquat. The later spray in March just eight months later should be 15 litres/ha 2,4,5-T at 36% to kill the emerging regrowth.

An alternative regime using the same principles is to burn, or crush and burn, in the late summer, say late February, then spray with 2,4,5-T at 11 litres/ha either after that autumn or in the following early summer. The next spraying

should be in the following March or April again with 15 litres/ha 2,4,5-T plus 20 litres diesel oil per hectare.

Should regrowth be earlier than anticipated, the second spray may be applied in the spring rather than late in summer or early autumn.

A pre-burn spray of 22 litres/ha 2,4,5-T may also be considered as a alternative to the proprietary 2,4,5-T/picloram mix.

BURNING QUESTIONS

One of the most important aspects of this four-stage control method is burning. Without it, many of perhaps 1500 gorse seeds present in every cubic metre of soil will germinate. The point is that a hot burn of say 100°C, which does not spread too fast, will destroy 96% of the seeds present in the top 5-7 cm layer of soil, said John Balneaves. Should the heat be anything less, significant seed destruction will not occur.

By raising the soil temperature to only 60°C any gorse seeds not destroyed will be stimulated to grow. These are the seeds which will emerge after the burn before the post-burn spray. Subsequent natural gorse germination will take place before the second post-burn spray. It is possible to alter the timing of the burn as long as the fire is hot enough to destroy sticks.

COSTINGS

The 1977 cost of materials for North Canterbury, without subsidy, was $282/ha. This is made up of: Crushing- $60 Pre-burn Spray- $65 Accelerants- $5 First Post-burn Spray- $92 and Second- $60. Cost of application is not included. Clearly the spray used does influence the cost as would the method of application.

Equally clearly, it's not a cheap method of control. But against this figure of $282 you can weigh noxious plants and development subsidies and the fact that under this system land has remained clear of gorse for four years so far.

(NZ FARMER- 14/12/78)

The Simple Life

"The thistle proves a great annoyance to some lands by killing the grass corn etc., although it be a sure token of the strength of the land. The way to destroy them is to cut them up by the roots before feeding time; the advantage you will receive will answer your expense and more."

John Worlidge- The Mystery of Husbandry Discovered and laid open. 1681

Arthur Healy

– NOT FORGOTTEN

FEW PEOPLE in the country have had more to do with weeds than Arthur Healy who in 1977 retired from the Botany Division of the Department of Scientific and Industrial Research.

Up until 18 months before his retirement he was Assistant Director of the Division, a position he had held since 1949.

He once said that most botanists were concerned with indigenous or native flora and up until recently only it seemed that only one or two in the country were concerned with introduced plants.

Because of his knowledge of weeds and plants, for many years Arthur was consulted by the Ministry (formerly the Department) of Agriculture regarding plants coming into the country. He makes no secret of the fact that he adopted a conservative approach to his work- if there was a possible chance of a plant becoming a problem his advice was "no" to it being allowed in. Agriculture already had enough problems, he said, and this was something a person could not afford to take a lenient view about.

A large number of the most serious weeds in New Zealand, he said, had been brought in originally for agriculture and horticulture, and then escaped.

Approximately three years before his retirement he said that he had been keen on a complete embargo being imposed on the introduction of water plants, but this had not been officially accepted although the Fitxharris Committee on Noxious Weeds Administration, of which he had been a member, had gone along with it.

Arthur was born at Fielding and educated at the Fielding Agricultural High School, Victoria University College and Massey College where he gained a bachelor of agriculture degree. After joining the Botany Division in 1941 to undertake a survey of nassella tussock in Canterbury, he did his thesis on his master of agriculture degree on the problem plant. He was the first to do his masterate from Massey outside the college.

After a period from 1946 to 1948 with the Public Works Department on soil conservation, he rejoined the Botany Division in 1949 and from that time on his work was very largly with weeds.

With the late Mr Jack Earl he took part in the drafting of the Nassella Tussock Act of 1946 and when the legislation was before Parliament he had the rather un-

ique experience of sitting near the Speaker's chair in the House of Representatives so that he could advise the Acting Minister of Agriculture, the late Mr C. F. Skinner.

He was on a committee, the work of which led up to the Noxious Weeds Act 1950, and he also sat on the Fitzharris Committee which has led to the Noxious Plants Act 1978.

Arthur Healy has acted as identifier of plants for the Ministry of Agriculture and also private firms. His work with weeds has brought him into close contact with agricultural chemical firms, local bodies and Government departments. Not forgetting Noxious Plants Officers.

From the late 1940's he had close contact with Noxious Weeds Inspectors (now Noxious Plants Officers) and in the mid 1960's was made an Honorary Life Member of their Institute.

Only a few years ago he was also made an Honorary Life Member of the New Zealand Weed and Pest Control Society.

Under the auspices of the Society he produced "Standard Common Names for Weeds in New Zealand" which was published in 1969, and"Identification of Weeds and Clovers" which was first published in 1970. The later was reprinted in 1976. It contained conference papers presented over the years mainly by Arthur and in the second edition the original papers were revised and papers given since the first publication included and also revised.

He also contributed a section on wild, introduced plants in Canterbury to the publication "The Natural History of Canterbury", produced by the Canterbury Branch of the Royal Society.

In 1977 the Royal New Zealand Istitute of Horticulture made him an associate member. From 1955 until the early 1970's he was a member of the Canterbury District Council of the Institute and he was also an examiner for the Institute's Diploma of Horticulture examination.

For many years he was a tutor in botanical classification for the Technical Correspondence Institute in Wellington.

Arthur may be retired, but one can be reasonably sure that the wealth of information, held in the head depicted above, will not be allowed to lie idle, never to be used again. (From an article appearing in "THE PRESS") ■

Weed Book ✪

A book not mentioned in the preceding article is "Common Weeds in New Zealand" which was authored by B.E.V. Parham and A.J. Healy.

It contains full-page black and white photographs, along with a brief description, of over 140 weeds. The natural size of the plants can be readily seen or calculated from the scales of magnification or reduction which are included on each plate. My copy, bought last year, cost $6.75. (Government Bookshop) ■■

Fighting Mad over PESTICIDE BANS

"OUR AGRICULTURAL CHEMICALS WORLD IS SLOWLY BUT SURELY UNRAVELLING AT THE SEAMS. BUT PERHAPS I SHOULDN'T BE SO ANGRY AND FRUSTRATED ABOUT IT."

This from Mr D.A. Watkins, formerly chairman of directors of Ivan Watkins-Dow Ltd, when addressing the 1978 conference of the New Zealand Weed and Pest Control Society.

"After all," he went on, "we are just a tiny portion of the world of chemistry fashioned by nature. Does it really matter if we go down the drain?

You and I know it does matter. World food-needs are going to triple in the next 25 years and meeting these needs will reqire the extensive use of agricultural chemicals. Will these continue to be available? I wish I could be sure.

"Ten thousand years ago life was short, nasty and brutish. As one of nature's creations, we got equal treatment with all the rest and spent our limited existence in a continuing bitter struggle for enough food and shelter to survive.

Balance of Nature

"Afflictions of one sort or another came early, caused enormous suffering and were seldom curable. We were, with a vengeance, an integral part of that so-called balance of nature.

"Fortunately, by chance or divine intervention, we acquired the ability to accumulate and preserve knowledge for future generations. Even more important, we converted this knowledge into useful technology that ensured for many of us longer, healthier, more comfortable and enriched lives. We became relatively free from the clutches of the natural world and we feel sorry for the hundreds of millions of people who still have not achieved this kind of liberation.

" Thus it is strange that powerful elements in our modern industrial societies seek not just to control the growth of technology, particularly chemical technology, but to abolish it.

"There is a senseless yearning to reincorporate with nature. It is an old malady that doesn't afflict the people of developing countries who are striving desperately to escape the balance of nature and gain control of their destiny. Unlike some of us they recognise clearly that the growth of technology is the underlying base for health, for wealth, and for all improvement in the human condition.

"What is surprising is how suddenly the malady developed. In 1910 our life expectancy was about 47 years. Today it is about 72 years. The growth of tech-

nology was the essential ingredient that gave us that remarkable improvement and chemical technology was one of the star contributors.

"Can we have forgotten so soon? Don't we believe any more in that marvelous slogan "better living through chemistry"?

"The trouble is the public are being led to believe that all man-made chemicals are hazardous and that naturally occurring chemicals are not when, in fact, no chemical is hazardous if properly managed.

"The public is being deceived when it is told that chemicals in nature are any less toxic or potentially less hazardous than man-made chemicals.

2,4,5-T

"The dioxin contaminant in 2,4,5-T and other compounds has been branded as a chemical of incredibly high toxicity, and indeed it is. After all, it is a thousand times more toxic than our most toxic pesticide. But did you know that the botulism toxins that can be formed in improperly canned foods are at least 50,000 times more toxic than our most toxic pesticide?

"We ingest about 40 mg of pesticides every year, an amount about equivalent to the tip of a lead pencil. If we drink coffee, we ingest about 40,000 to 400,000 mg of caffeine each year, depending on whether we drink one or ten cups a day. Caffeine is not innocuous. It takes a dose of about 10-20 grams to kill you, which is the amount in about 100-200 cups of coffee. Also, it is mutagenic, teratogenic and carcinogenic, just like a host of other toxic natural products that we consume in greater quantities than pesticides everyday.

Nicotine

"Are you a smoker? The average smoker inhales about 1 mg of nicotine and 10 mg of tar into his lungs everytime he smokes a cigarette. That adds up to about 40-160 mg of tar every year, depending on whether you smoke half a pack or two packs a day.

"Nicotine has an acute oral toxicity to rats of about 50 mg per kg more toxic than most pesticides. It only takes a dose of about 2.5 to 5 grams to kill you. This is the amount in the smoke from 125-150 packs of an average cigarette. Tar contains potent carcinogenic compounds. Heavy smikers of an average cigarette inhale about a third of pound into their lungs each year.

"The problem is that neither the news media nor the public agencies are accurately informing the public on the distinction between toxicity and hazard and the relationship of toxicant concentration to expression of toxicity.

"Who would be foolish enough to predict devastation by a genetic breeze from observing the impact of a hurricane? .But that is the kind of prediction being done with many types of agricultural chemicals.

Voices of Chaos

" The voices of chaos are a mixed bag and much too noisy. Who are these people?

What are they like? Well, there are the fearful, the ignorant, and the superstitious who see demons in the form of pesticides around every corner; the anti-technologist who promotes the fear of pesticides to hasten their demise; the scientist who promotes the fear of pesticides in hopes of gaining funds for support of his research; the fear of pesticides for political gain and power.

"The voice of chaos is having an impact. A number of major pesticides have been banned or withdrawn from the marketplace. An initial working list of 45 pesticides that may be considered too dangerous for use are scheduled for rebuttable presumption hearings - in short, guilty until proven innocent.

"It is not my intention to paint a picture so bleak that you get discouraged and give up. I would rather have you fighting mad. We, in the pesticide industry , have an enormously important job to do and that is to control pests, improve health, and increase food and fibre production.

"A lot of misguided, cynical and self-serving people are getting in our way. Everyone of you needs to make sure that your pesticide house is in order by any reasonable standards.

"And you need to keep raising your voice until it is clearly heard in the press, on television, in the courts, by our public agencies and most of all, by the long-suffering public." (THE MARLBOROUGH EXPRESS 1978 A & P Show Supplement) ■■■

Aerial Operators **WARNED**

The Minister of Civil Aviation, Mr McLachlan, has warned the aviation industry about accidental crop damage through aerial spraying.

There had been a number of reports of crop damage in recent months, he told the Aviation Industry Association's conference in Nelson.

The Ministry of Transport would seek comment on proposed conditions to be observed when aerial spraying was done near susceptible crops and built-up areas.

"We don't want to 'get heavy' with spraying operators," said Mr McLachlan. But there was considerable public pressure for legislation in this area.

The industry should take great care to avoid the need for restrictive and punitive legislation forced by public outcry. (NZPA- Marlborough Express) ■ ■

What Exactly Does Toxicity Mean?

Everything is toxic at some concentration, reports AGCARM.

For example, salt is essential to the human diet but it can cause death and in fact has been used by the Chinese as a method of committing suicide.

PLANT RUNDOWN

Californian Thistle

by G. W. IVENS,
Senior Lecturer,
Weed Science,
Massey University.

KNOWN as Californian thistle in New Zealand, as Canada thistle in California, and as Creeping thistle in Canada, Circsium arvense has been a troublesome weed since it first appeared in this country about 100 years ago.

Californian is the only true perennial thistle in New Zealand, and, as a result, is the most persistant and difficult to control. Below ground, it consists of vertical rhizomes penetrating deeply into the soil and giving rise at intervals to horizontally creeping roots. Both the rhizomes and the creeping roots are capable of giving rise to new shoot buds.

In old pasture, most of the root system may be below 50 centimetres and shoots originating from root fragments only 2.5 centimetres long can reach the surface from this depth. If exposed to the air, however, the roots dry out readily and exposure on the soil surface for only 24 hours results in loss of viability.

Rosettes

The shoots die back each year in the autumn, and the plant remains dormant through the winter. New shoots appear in early spring and form rosettes, from which flowering stems develop in late spring and summer.

Spread is mainly by vegetative means and, under favourable conditions, the roots can grow as much as 12 metres in a year. In Australia, an average rate of spread of 1.5 metres a year has been recorded with established patches of Californian thistle in pasture.

Male flowers producing pollen only, and female flowers which can produce seed but not pollen, are borne on different plants. As single plants gradually develop into colonies, it is common to find extensive patches of thistles with all-male or all-female flowers. The different sexes must be within about 50 metres of each other for fertile seed to be set.

Male flowers can be distinguished from female by their brighter purple colour and more spreading shape. Once formed, seeds may remain dormant in the soil for a number of years. They germinate best at depths of one to two centimetres.

The seedlings are very susceptible to competition from other plants and can survive only on bare ground, so that seedling establishment in pasture is rare.

When established, the weed competes strongly with crop plants for nitrogen and water, and, at a density of 30 shoots per square metre, has reduced yields of wheat by 60%. In glasshouse trials, extracts of roots or foliage have been found to reduce the growth of numerous crop plants.

There is little information on the losses in pasture production caused by Californian thistle. As with other thistles, however, quite apart from the reduced pasture growth resulting from competition, the prickly nature of the plant deters stock from grazing much of the fodder that does grow.

Control is difficult, more so in pasture than in cultivated land. Cultivation alone is a laborious method but, if land can be fallowed for a whole season, successful results are claimed.

It is necessary to cultivate to a depth of about 10 centimetres, when the first shoots appear in spring, and again at intervals of three weeks until growth ceases in the autumn. This treatment causes shoots to be sent up from deeper and deeper layers in the soil until, eventually, the food reserves are exhausted.

Regular cutting every time the plants appear above ground would also be expected to gradually exhaust food reserves. It is rarely practical to use this method in pasture, but good results are possible in lucerne.

Technique

The lucerne recovers more quickly after cutting than the thistles and, with 4 or 5 cuts during the summer, the weed is gradually eliminated over a period of three or four years. This technique is by no means new, having been recommended in the New Zealand Journal of Agriculture more than 60 years ago.

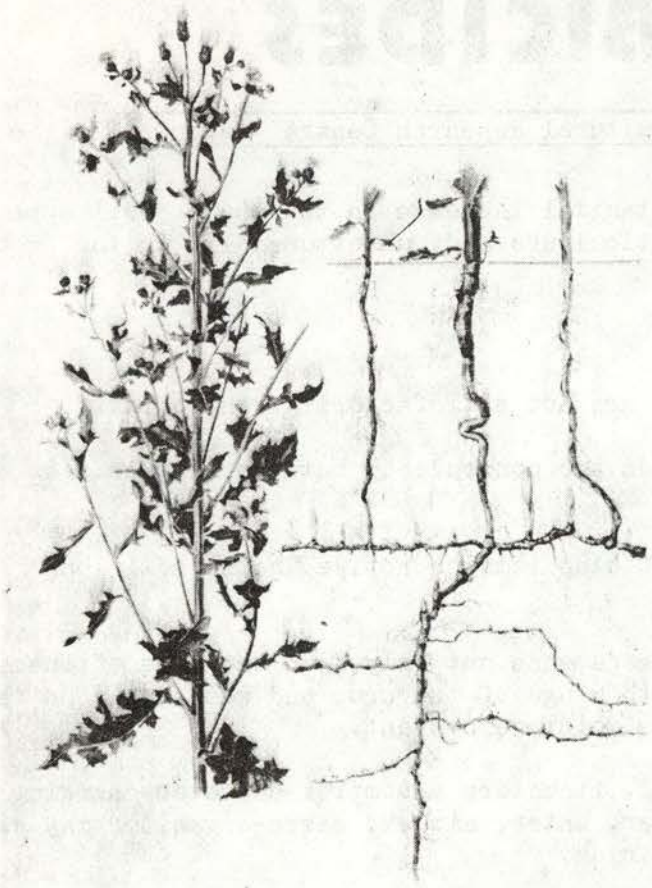
Recommendations for control with chemicals have changed surprisingly little in the past 20 years. The best results can be obtained in crops, as the initial land perparation breaks up the shallower parts of the root system and has a weakening effect. A tall-growing, strongly competitive crop also helps to limit the weed's vigour.

In cereals, MCPA is the recommended chemical and should be applied when the thistle shoots are 15 to 30 centimetres high. At this stage, food reserves are low and the leaves still soft enough for good absorption to take place. Complete control in a single season is unlikely to result, and it is generally necessary to repeat the treatment in another tolerant crop in the second year to obtain permanent control.

In established pastue, the effects of cultivation and shading cannot be utilised, and MCPB, although less active than MCPA, is preferred because it is less damaging to clovers. Using MCPB, Californian thistle can be greatly reduced by spraying at the rosette stage in spring and again in autumn, but at least three years' treatment are likely to be needed to obtain effective control.

If a certain amount of clover damage is acceptable, MCPA may be used to speed up the process, and the clover damage can be reduced to a minimum by grazing hard before spraying to reduce the leaf area and so minimise chemical uptake.

Of the newer hormone chemicals, picloram - generally used in combinations with 2,4-D - gives more lasting control than MCPA, but has a very damaging and persistent effect on clovers. This material is suitable for use on waste land, but



CALIFORNIAN THISTLE: At right, vertical rhizomes are shown giving rise to horizontally creeping roots. Both rhizomes & creeping roots are capable of giving rise to new shoot buds.

on pastures could only be considered as a spot application. Similar considerations apply to the use of dicamba. Successful thistle control with picloram in seed crops of red fescue and timothy has been reported from the United States.

Destruction

The new chemical glyphosate appears to work well against Californian thistle, although it is not selective. Because it kills grasses as effectively as it does thistles, and because it has no residual effects, glyphosate can be used for the destruction of grass swards containing thistles before undertaking direct-drilling operations.

Applications of glyphosate to well-grown thistle rosettes, in spring or autumn, gives a large measure of root kill, and good results have been obtained with directed application in apple orchards. In Canada, successful use has also been made of carefully directed treatment in maize.

In other Canadian work, success has been claimed using atrazine in in maize. The method involves double application (pre-ploughing and post-emergence) in two consecutive years. The chance of this technique succeeding in New Zealand is not known but, as many of our maize-growing soils are high in organis-matter content, it might be expected that relatively high rates of application might be needed.

As with most other pasture weeds, very little information exists on the economic losses caused by Californian thistle. With a better understanding of the increased levels of production that could be expected from thistle control, it would become much easier for farmers and advisers to decide how much it would be worth spending on control measures. (NZ JOURNAL of AGRICULTURE- November 1978) ■

I WONDER WHO SAID

"Victory Finds a hundred fathers. Defeat is an orphan."

"There is no good answer to a stupid question."

Problems with HERBICIDES

by D.J. SWAIN Horticultural Research Centre Levin

n recent years, there has been a substantial increase in the use of soil applied herbicides in agriculture and horticulture and, unfortunately, in the problems associated with them.

Three types of problems may arise:

1. Lack of activity - where the weeds are not satisfactorily controlled.

2. Excessive activity - where the weeds are controlled, but the crop is also damaged.

3. Prolonged activity - where the herbicide remains active in the soil long enough to damage subsequent crops.

The activity of soil-applied herbicides depends not only upon the type of chemical, its application rate, and the growth stage of the crop and weeds, but on the soil type, its physical condition and its moisture content.

When a herbicide is applied to the soil, it enters a complex and ever-changing system. The soil minerals, organic matter, water, air and micro-organisms may all effect the fate and activity of the herbicide.

DIFFICULT

Because of the complexity of the soil system, the wide range of soil types used for cropping in New Zealand, and the large number of herbicides available, it is often difficult to predict herbicide behaviour in specific situations. A knowledge of the factors which affect herbicide activity in the soil may, however, help you to recognise potential problems and to find ways of avoiding them.

Herbicide molecules in the soil are attracted to the surface of organic matter and clay particles, where they are held tightly or adsorbed. When this happens, the herbicide is much less available for plant uptake than if it is moving freely in the soil water.

Herbicides vary in their degree of adsorption by soil. Some, like diquat and paraquat, are immediately adsorbed almost completely and permanently. Because of this very strong adsorption, they are unavailable for plant uptake. Others, such as TCA, are adsorbed very little, and remain mainly in the soil water. With many common herbicides, however, between 80 and 90 per cent of the chemical is adsorbed in most agricultural soils at normal field moisture contents.

LESS ACTIVITY

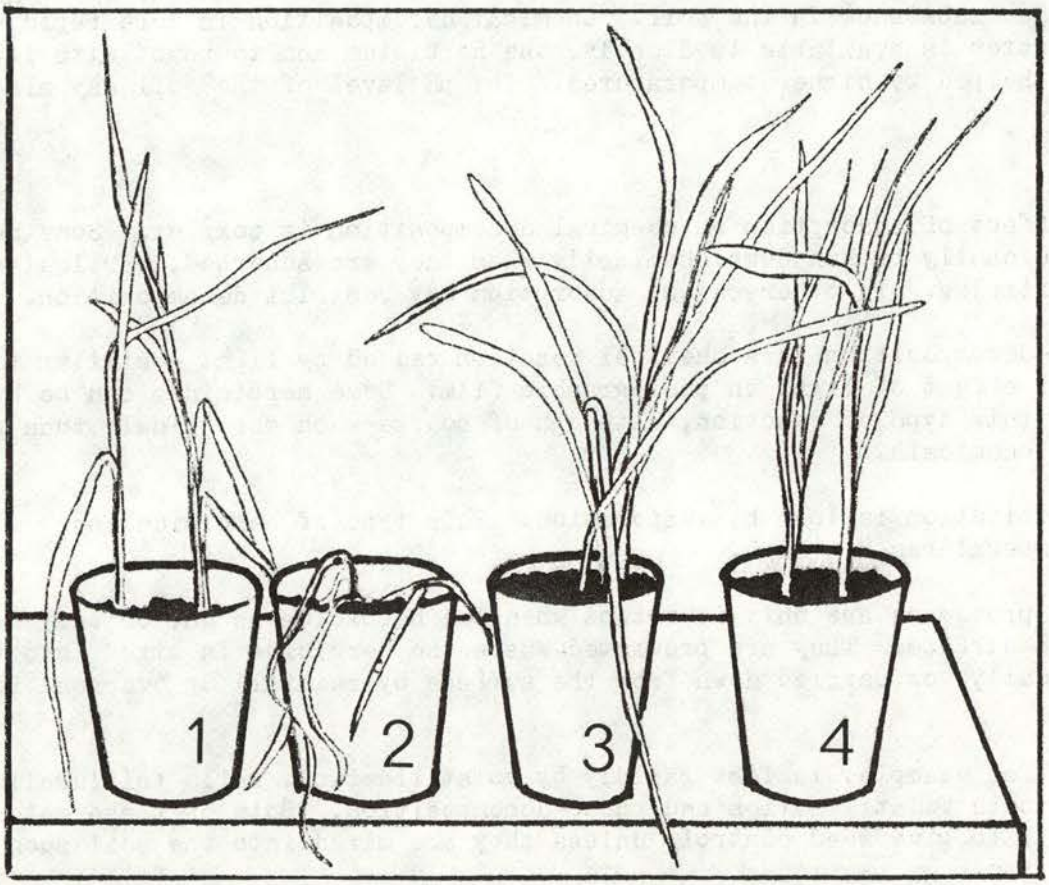
The strongest adsorption of herbicides is on to the soil organic matter. More

herbicide will, therefore, be tied up by adsorption in soils with higher organic-matter contents. As a result, herbicides show less activity in organic soils than in mineral soils. In peat soils it may be difficult to get herbicides to work at all.

Clays also adsorb herbicides, so herbicides will be more active in light sandy soils than in heavy clay soils with the same organic-matter content.

Herbicide adsorbed on to soil particles can later be released, and a balance is kept between the adsorbed herbicide and the herbicide in solution in the soil water. As herbicide is removed from solution by plant uptake or some other process, adsorbed herbicide is released into solution to maintain the balance. If the soil dries out, and the soil solution becomes more concentrated, more herbicide will be adsorbed.

Ad sorption of some herbicides is affected by the soil pH level, many being adsorbed more strongly under acid conditions. Herbicides, therefore, may be more active in a heavily limed soil than they would be in the same soil without lime.



LEFT-hand pair of pots contains 3 per cent organic matter.
1. No herbicide 2. 0.4 ppm metribuzin

RIGHT-hand pair of pots contains 29 per cent organic matter.
3. No herbicide 4. 0.4 ppm metribuzin

By decreasing the concentration of herbicide freely available in the soil, adsorption affects not only the activity of the chemical in the soil, but also its response to some other processes.

DECOMPOSITION

Most herbicides eventually break down in the soil, to compounds which are harmless to plants. Effective herbicide life in the soil varies from a few days to a year or more.

There are two pathways by which herbicides are broken down in the soil, microbiological attack and chemical reactions. Microbiological decomposition of herbicide will be more rapid under conditions favourable to microbial growth - a moist, but not waterlogged soil with plenty of organic matter, and warm conditions.

Adsorption generally slows microbial breakdown, as herbicide held on soil particles is partly protected from attack.

Some herbicides decompose by purely chemical reactions with water, oxygen, or some other substance in the soil. Chemical decomposition is more rapid where adequate water is available to dissolve the herbicide and to react with it, and it is also helped by higher temperatures. The pH level of the soil may also be important.

COMPLEX

The effect of adsorption on chemical decomposition is complex. Some herbicides are more easily broken down chemically when they are adsorbed, particularly on clay particles. In other cases, adsorption may restrict decomposition.

Photo-decomposition is a chemical reaction caused by light - similar to the chemical effect of light on photographic film. Some herbicides can be broken down by this type of reaction, although of course much more slowly than photographic chemicals.

Volatilisation is loss by evaporation. This type of herbicide loss is greater when temperatures are high.

These processes are only important when the herbicide is on, or very near to the soil surface. They are prevented where the herbicide is mixed into the soil mechanically, or carried down from the surface by rainfall or overhead irrigation.

EPTC, for example, is lost rapidly by volatilisation, while trifluralin is lost by both volatilisation and photo-decomposition. Both of these materials will fail to give weed control, unless they are mixed into the soil soon after application.

Other herbicides, such as diuron, are broken down more slowly by photo-decomposition. When they are applied to the soil surface, and no rain or irrigation follows within a couple of weeks, some effectiveness may be lost.

Leaching - movement downward through the soil in draining water - is not usually important in removing herbicide from the soil, but can be important in moving it within the soil. Herbicide leaching is restricted by two factors- the limited solubility of many herbicides, and their adsorption.

DISSOLVED

Before a herbicide can be leached, it must first be dissolved. Dissolving some of the less soluble herbicides requires large amounts of water. The equivalent of 2.4 millimetres of rain will dissolve 1 kilogram of diuron per hectare, however, 20 millimetres are required to dissolve the same amount of simazine.

Even more important than limited solubility, is the effect of adsorption on leaching. Moving water can carry only that part of the herbicide which is freely dissolved. As dissolved herbicide is released, adsorbed material will be released into the water, but the speed of downward movement will be greatlt reduced. If 80 per cent of the herbicide is adsorbed, the downward movement of the chemical will be only one-fifth as fast as the flow of water.

Herbicide, is therefore, unlikely to be leached out of the root zone of crops, except on very light sandy soils with little organic matter. Leaching is important, however, in koving surface-applied herbicides into the soil, where they can be taken up by plant roots. Sometimes excessive leaching may carry herbicides from the surface deep enough into the soil to be picked up by the roots of susceptible crops.

COOLER ZONE

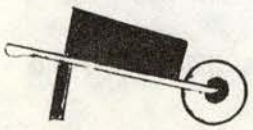
Below the cultivated layer of the soil, organic matter content is low and temperatures are generally cooler than at the surface. If herbicides are leached into this zone, their residual life is likely to be increased because of the lower microbial activity.

Herbicides are taken up by plants, so growing a tolerant crop may be considered as a way of removing residues from the soil.

Crops, however, also have other effects. They shade the soil, reduce soil temperatures, and remove moisture. Their effects in reducing photo-decomposition, volatilisation and microbial activity may more than balance out the removal of herbicide from the soil.

Experiments have shown no consistent decrease in herbicide under crops compared with uncropped areas.

It is not possible to give ready answers to problems of particular herbicides in particular soil types. This outline of the principles involved should, however, make it easier to understand some of the apparently inconsistent behaviour of herbicides in the soil, and may suggest some of the factors that should be taken into account when planning herbicide use. (NZ JOURNAL OF AGRICULTURE) ■



"Some people resemble wheelbarrows.

They always stand still until they are pushed"

□

A SHOCKING WAY TO KILL WEEDS

Pass an electric current through a plant at high enough power and the plant dies. Death is caused, among other things, by the conversion of electrical energy to heat.

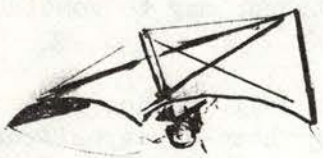
Workers at Sheffield University in the UK believe that this technique can be developed into a practical method of weed control. The advantages are that it is entirely non-poluting, that it can be done fast (about 1 ha/hr), and that the cost would be equivalent to the use of herbicide. It can be used to remove only those plants growing above a certain height, but in general it is non-selective.

The method under test uses a tractor fitted with a generator and high voltage transformer. A circuit through the weeds is effected by a spiked wheel and a conductor fixed in a nylon holder to brush across the tops of the weeds. This conductor can be adapted to suit different crop patterns. The method operates well under a wide range of weather conditions.

Another way to use electrical energy is in the form of micro-waves, which can be directed into the soil to kill weeds seeds and pests such as nematodes. Wave lengths can be chosen so that only the pests are killed. Unfortunately, effective results have so far only been obtained under exposure rates which would be too expensive except under special conditions, for example, in glasshouses.

(As reported in the NZ FARMER 8/3/79) ■

Do-It-Yourself: AERIAL SPRAYING

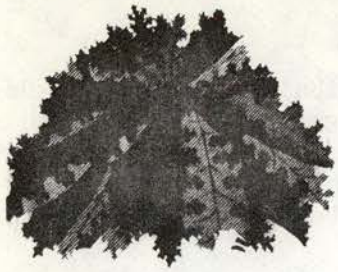


Now you can apply herbicides or pesticides from the air without paying an expensive contractor or even taking your feet off the ground. All that is needed is wind of at least 5 knots and the capital to buy an ingenious kite designed by an R.A.F. officer in the UK.

A steerable kite, described as a "flying machine", has been around for some time. A bigger version (about 3m across) has been modified to carry a small spray-rig which can deliver ultra-low-volume sprays, with controlled droplet size. The capacity of the tank is sufficient to spray about 5ha, taking 2 hours to do the job. Depending on the direction and speed of the wind the kite can be flown 1m to 10m above the crop.

Spray delivery can be controlled so that when the kite traverses in one direction spray is on, and on the return trip it is off. Also movement up or down can be arranged to actuate the shut-off valve. Another ingenious feature is a tube connection down to the operator which can be used to replenish the kite's spray tank, if higher volume sprays are needed.

(As reported in the NZ FARMER 8/3/79) ■



RAGWORT
— ITS BIOLOGY

A.I. POPAY RESEARCH DIV. M.A.F. PALMERSTON NTH.

▶SEED GERMINATION, DISPERSAL AND LONGEVITY

A single plant can produce as many as 150,000 viable seeds: the seed rain falling onto the ground can be as high as 16,000 seeds per square metre. Seeds can be dispersed by water, by stock, by agricultural machinery, with agricultural seed and in hay. Wind dispersal has always been a contentious, but some recent work carried out in Scotland has indicated that the seed numbers falling 40 metres from a ragwort infestation can be as high as 40 seeds per square metre.

Although most seeds germinate soon after being shed, any which become buried can remain dormant in the soil for some time. After two years, between 16% and 23% of seed originally present in the top 1 cm of the soil can still be viable: 45% of more deeply buried seed may still be alive after two years. However, seed which is buried is not likely to germinate unless it is returned to the surface.

Germination can occur at any time of the year if soil moisture and temperature are suitable: most seeds germinate in the autumn after they have been shed.

▶SEEDLING ESTABLISHMENT AND SURVIVAL

As in the case of populations of most species, the youngest ragwort plants have the highest mortality rate. In one piece of work done in Scotland 57% of all germinating plants died as seedlings, 29% died as single rosettes and 6% as multiple rosettes: the remaining 8% died after flowering. Results would probably be similar here. The causes of death of individual plants and of sometimes whole populations of plants are not known but probably include pasture competition, disease, inverterbrate attack, moisture stress etc.

▶VEGETATIVE REPRODUCTION

Physical or sub-lethal chemical damage to ragwort plants results in the formation of multiple crown plants. However, multiple crown rosettes can also develop in plants grown in glasshouses or in protected field cultures.

Roots detached from the parent plant can form buds and then new aerial shoots. Pulling, grubbing, cutting, treading or removing leaves can cause roots to be separated from the plant and to start growing independently. However, roots left in the ground if plants are pulled during flowering are less likely to grow again than roots which become detached at other times.

▶LIFE CYCLES

Ragwort is usually regarded as a biennial, but it seems that its behaviour depends very much on the conditions under which it is growing. When grown in cultivated ground, free of plant competition, as many as 50% of the plants can flower and die less than a year after germinating. In this situation, these plants behave as annuals. Where pasture competition is intense then plants can remain as rosettes for two or more years before flowering.

When a plant has flowered, it does not necessarily die. In some populations (measured in places as far spread as Aberdeen, Victoria and the Waikato) about 50% of the plants can flower at least twice. It has been known for plants to flower in one summer, remain as rosettes in the second summer and to flower in the third summer. On the other hand, a large proportion of the population may, in some years, behave as biennials and very few become perennial.

Although damaging the plant will increase the chances of its becoming a perennial, the behaviour of plants is variable anyway.

▶SUMMARY

If a plant is regarded as the means by which a seed reproduces itself, then ragwort seed is very efficient. The plant which the seed grows into is certainly capable of producing large numbers of new seeds, it is hard to completely kill without the use of herbicides and it adapts itself well to its environmental conditions, being able to act as an annual under very good conditions but also capable of behaving as a perennial if conditions are more suitable, for such a life form. The seed itself can germinate at any time of the year and, if it doesn't germinate, can remain viable in the soil for long periods.

Because of the variable behaviour of the seed and the variable behaviour of the plant, any ragwort population consists of a wide range of ages and sizes of plants. This in itself contributes to the difficulty of controlling a ragwort population with a single application of herbicides. ■

THAT'S SOME JAW ACTION!

AN AUSTRALIAN SCIENTIST, Dr T. Stubbs, at the CSIRO Division of Tropical Pastures, Brisbane, has developed a device which can be fitted to a cow's head and sense movements of the jaw. It can count these movements, and distinguish between chewing with head down (grazing) or with head up (ruminating). The relationship between these counts gives an indication of how much per bite the cow takes when grazing. This indicates how palatable the grass is and how easy it may be to graze.

The machine has recorded that a cow, in an average day, will chew about 76,000 times; starting just before sunrise and going on until an hour after sunset.

The maximum intake of grass takes place when it is not more than 30cm high. The results explain how cows can stand in high dense pasture and not get enough to eat, because of the difficulty they have of getting adequate sized bites from tall, stemmy, grass.

(As reported in the NZ Farmer 11/1/79) ■

NOTICE TO THOSE MEMBERS NOT ATTENDING CONFERENCE

If you are a financial member you are entitled to have your vote recorded at Conference by way of proxy. Any member attending Conference may cast a vote of proxy subject to that person showing the Chairman written evidence that he has such authority. The following is the Form of Proxy.

PROXY FORM

The National Secretary
Institute of Noxious Plants Officers
P.O. Box 61
BLENHEIM

Dear Sir,

I hereby advise that being a financial member of the Institute of Noxious Plants Officers, and entitled to vote, that I hereby give written authority to the member mentioned hereafter to cast my vote by proxy under Section 12(f) of the Constitution. The instructions to that member have been made in writing, a copy of which is attached.

Member with power of Proxy: _____

The Member's Address: _____

_____

I also hereby ask that the 30th Annual General Meeting in Queenstown be advised of this vote by Proxy, and that it be recorded.

Yours faithfully,

_____

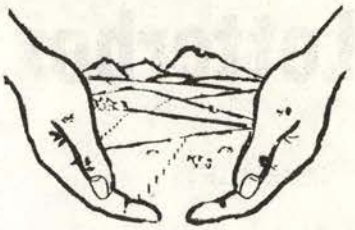
Signature of Authorising Person

Local Authority: _____

Dated at _____ this _____ day of _____ 1979

THE INSTITUTE OF NOXIOUS PLANTS OFFICERS INC.

Members' Section



EDITOR'S PLEA

After a lapse of some seven months without an appearance of PROTECT an apology is due, and is offered. But I do not feel that the fault is entirely that of the Editor. There just isn't the material coming forth.

The majority of us just don't have the time to read every agricultural publication that comes out, in order to pick up perhaps one item dealing with weeds, noxious plants, control methods, new ideas and the like.

But I feel sure that every such article is read by at least one member of INPO. That is where PROTECT can play its designed role. To bring all such articles together into one publication, for ease of reading, convenience of reference.

However it needs those who find these items to take the time to send them into me and unless they do, then I fear for the continuence of PROTECT.

I would rather receive 50 copies of the same article, than not receive it at all.

I often think it a shame that an account of a trial etc., conducted by an NPO comes from a newspaper item rather than from the Officer. There's the story of the Cinnabar moth in the Wairarapa. The finding of a rare native broom species in Marlborough and goodness knows how much trial-work being carried on throughout New Zealand.

PROTECT has potential. Let's exploit it, and above all, let's support it.

Personal regards, Stan Dulieu

Letterbox

DEAR SIR,

It has come to my notice from various members of our Institute and from enquiries made personally to the T.C.I. that there still exists some confusion regarding the correspondence course.

It appears that some members have thought they have exemptions from certain portions of the course. Unless you have qualified proof such as exam results, anyone accepting the course is granted no exemption. Most Officers, however, have as a matter of course studied the Agriculture Pesticide Course through the T.C.I. and most have successfully passed the exam. If this is your situation, you are therefore exempted from assignments 1-6, Stage II.

The point being made is that everyone attempting the T.C.I. Course must begin at Stage I. Communication English is also compulsory unless you happen to have studied the T.C.A. English Course as included in the N.Z.C.E. or N.Z.C.S. School Certificate and University Entrance passes in English are not sufficient for English exemptions.

I am personally just beginning Stage III of the Course, having begun Stage I and Stage II (I was exempted from both Ag. Pest and English) in August. From my observations I believe all N.P.O.'s could do these first two stages (except Ag. Pesticides) "on the ear". I believe an average of about two hours per assignment would be sufficient.

I realise that some criticism can justifiably be given to Stage I, but it must be realised that Stahe I is the best which could be provided at the short notice given. It is likely that if we have not taken assignments from other courses (Pest Boards) we would have had to wait many years before getting the Course off the ground.

The assignments in Stage I provides some useful points, but more importantly they give you an opportunity to get into the habit of doing assignments as well as giving the tutor a chance of assessment. The two Stage II assignments on Forestry, I found very helpful and informative.

From what I understand from members of the Training Sub-committee of the Noxious Plants Advisory Committee, there is no compunction on existing Officers who were employed prior to August 2nd 1978 to study the T.C.I. Course. However: all existing Officers are encouraged to do this study. To this end Staff Assessors in my own county are looking favourably at increasing the Qualification Allowance for the Ag. Pesticides Course by about 30 per cent for holders of the Noxious Plants Officers Certificate of Proficiency.

All new Officers, those employed after the final reading of the Noxious Plants Bill on August 2nd 1978, will be required to complete the Course. This is my understanding.

If you are not satisfied with what has been offered, I would suggest you make constructive suggestions as to improvements which could be made rather than just straight criticism. It is realised that the Course needs some rationalisation into something more applicable, but with a re-organisation of the Agricultural Section at T.C.I. this should be available in the future.

K. Doig
NOXIOUS PLANTS OFFICER
SOUTHLAND COUNTY COUNCIL

CONCERN EXPRESSED

Concern has been expressed by the Noxious Plants Advisory Council that some Officers may be laying themselves open to criticism by refusing to pass subsidy claims on a particular chemical or brand of chemical. The official stand on this matter is that any chemical which has an Agricultural Chemical Board label recommendation for a particular weed must be available for subsidy purposes, providing that the conditions of a programmed control exercise are met.

The time for discussion and approval is at the time of approving a programme, not at the time of subsidy claiming.

E.T.O.

For those members who may be a little behind with the news, our Executive Training Officer is Mr David Parkes, who began duties in early January.

Mr Parkes formerly held a position with the Contracting Industry Training Council.

Those members attending Conference at Queenstown, (Frankton to be precise), will no doubt be afforded the opportunity to make his acquaintance.

MANNERS

All members want to see the Opening Session of Conference run with the decorum it deserves.

Such decorum is brought about by member's standard of dress and general demeanour. All of us will agree that visitors are deserving of our courtesy, not only during the Opening Session, but at the following morning tea also.

Having speakers address a meeting where the front half of the hall is empty and the back half looks like a respectable watersiders convention, does nothing for the image of our Institute.

This is the only occasion at Conference when some formality is desirable. Let's make sure it has it.

PETER KLARICICH - HOKIANGA **CHARLIE SAMSON - WAIPAWA**

BRANCH NEWS

South Auckland

A meeting of the above Branch was held at Whakatane on Wednesday, 14 February 1979.

Besides the fifteen members in attendance, were Mr Jim Fox, Chairman of the Whakatane District Noxious Plants Authority and Mr Gerald Atkinson from Ruakura.

Among the subjects brought up in General Business, were:

NATIONAL BODY REPRESENTATION

Concern was expressed by the meeting that Mr Congdon, as our representative on the National Body, was not really able to represent us adequately, particularly when we as an Institute appeared not to be feeding him the information he needs to do so.

It was agreed that we should be supplying more information to our National Executive in order for them to keep Mr Congdon informed.

LILY OF THE VALLEY VINE

Following a query from Arnold Feierabend, discussion resulted in the information that Krenite will control Lily of the Valley Vine and probably Roundup will control it as well.

VOTING RIGHTS AND REPRESENTATION

Mr Atkinson expressed surprise that we had no voting rights on the Regional Co-ordinating Committee and no representation on the Agricultural Chemical Board. He asked what we were doing about it.

Discussion pointed out that there had been action but it had failed.

Members feel that we have proved our ability and have something to offer on the Regional Co-ordinating Committee, and that the subject of voting rights be pursued. Two motions were carried: The first, that the Nat. Executive be encouraged to seek voting rights on the Regional Co-ordinating Committee; and the second, that they seek representation on the Select Committee of the Pesticides Act.

WEED TRIALS

Mr Atkinson of Ruakura informed the meeting that many queries regarding weeds were received each year but not all could be answered as they required much research.

He pointed out that should each Noxious Plants Officer conduct one trial yearly, this would contribute a great deal to the information available throughout the country.

The Weed Research Group would encourage and assist in such projects where-ever they could, to the extent they were able to.

East Coast/ Hawkes Bay

The Dannevirke County Council Chambers were the venue for the A.G.M. of the above Branch, held on February 23, 1979.

Guest Speaker, Mr L. Hunter, Chairman of the Dannevirke County Council, welcomed those attending and then went on to speak about the eradication of various plants such as gorse and ragwort. He mentioned the lack of support that some Inspectors experience from their councils, and hoped that weed problems would be improved with the new act.

The second Guest Speaker was Mr R. Darwin Farm Advisory Officer with the M.A.F. He chose for his topic of discussion, Ragwort.

Ragwort, he said, had been around for a long time and was likely to be around for a few years yet. He suggested that the local NPO spends approximately 80% of his time on ragwort and if the Government Subsidy were removed, big problems would arise in the area.

He then asked for comments from members on their own areas. Graphs were shown regarding trials, the sites being of the multi-crown type plant. Chemicals used were: 2,4-DB, 2,4-D, 2,4-D/picloram, and 2,4-D/dicamba.

The single autumn spray was of no use. The single spring spray was the best. 2,4-D/picloram proved most effective, followed by 2,4-D/dicamba, then 2,4-D ester. Clover damage was discussed with another graph showing the following results: 2,4-DB- no effect, 2,4-D- some effect, 2,4-D/dicamba- wipe out in spring, and 2,4-D/picloram- wipe out in autumn.

Costs were looked at and Mr Darwin felt this to be a very important feature which both farmer and NPO must deal with. Chemical subsidy does help but ragwort is a high-labour-content weed.

Costs were also shown on a 1977 basis. The trial showed that double spraying was neither cheaper nor better and that the single spring spray was the best.

Another trial was arranged with the aim of testing the Les Matthews theory. Plants ranged from seedlings to flowerheads. The area was divided into three.

In October 1978, one third was sprayed with 2,4-D/picloram at 4½ pints/acre, one third with 2,4-D/urea/fertilizer, one third was cut and just fertilized.

Results, nine months later, were: Plot No.1- (2,4-D/picloram) no ragwort; No.2- (2,4-D/urea/fertilizer) reasonable; No.3- (cutting and fertilizer) ragwort in abundance. Clover is also back in the best plot now. Most plants treated were of the multi-crown variety.

Mr Darwin spoke about follow up treatments and some of the complications encountered during the trials. Pulling of plants in the dry summer is probably okay while the ground is dry but under different conditions would be a waste of time. Heavy grazing by cows does get rid of a lot but the net result is multi-crown plants coming away later. The use of heavy rates of chemical is being advised because of this situation. Lower rates are used when the landowner is treating seedlings only.

After discussing the problems that NPO's have in getting farmers to eradicate ragwort, he invited questions from the floor.

Q. At what stage should spraying be done?

A. From seedlings to rosette young seedlings, 2,4-DB only. October onwards, 2,4-D +. It is not a black and white matter, so a decision cannot be made until each area has been looked at when the range of plants will decide the time and rate.

Q. What is the range of distance seed will travel from the parent plant?

A. About three feet (one metre) from the parent plant, but in strong wind conditions, a very long way. The proportion of viable seed, however, is reduced because the lighter seeds would have less chance of ever germinating.

Q. Doesn't the 4½ pints/acre mentioned destroy the clover?

A. The clover sprayed was in pasture over ten years old. I would never recommend such a high rate for young clover. The desity of clover in the trial plot was approximately one third clover, one third ragwort. Nine months later there is still good clover cover.

Q. What would you recommend where a council required a paddock of flowering ragwort to be cleared?

A. Perhaps mowing or pulling. You would create a problem for afterwards, that of multi-crowns, but it would overcome the immediate problem.

Q. Are the problems found in the Dannevirke County confined to dairy farm situations or not?

A. The areas would be 95% dairy farm problems although a lack of feed has created problems elsewhere. ■ ■

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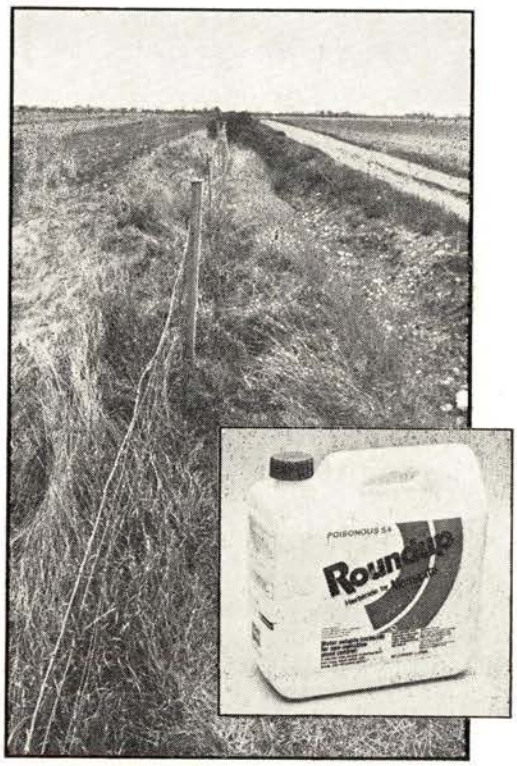

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