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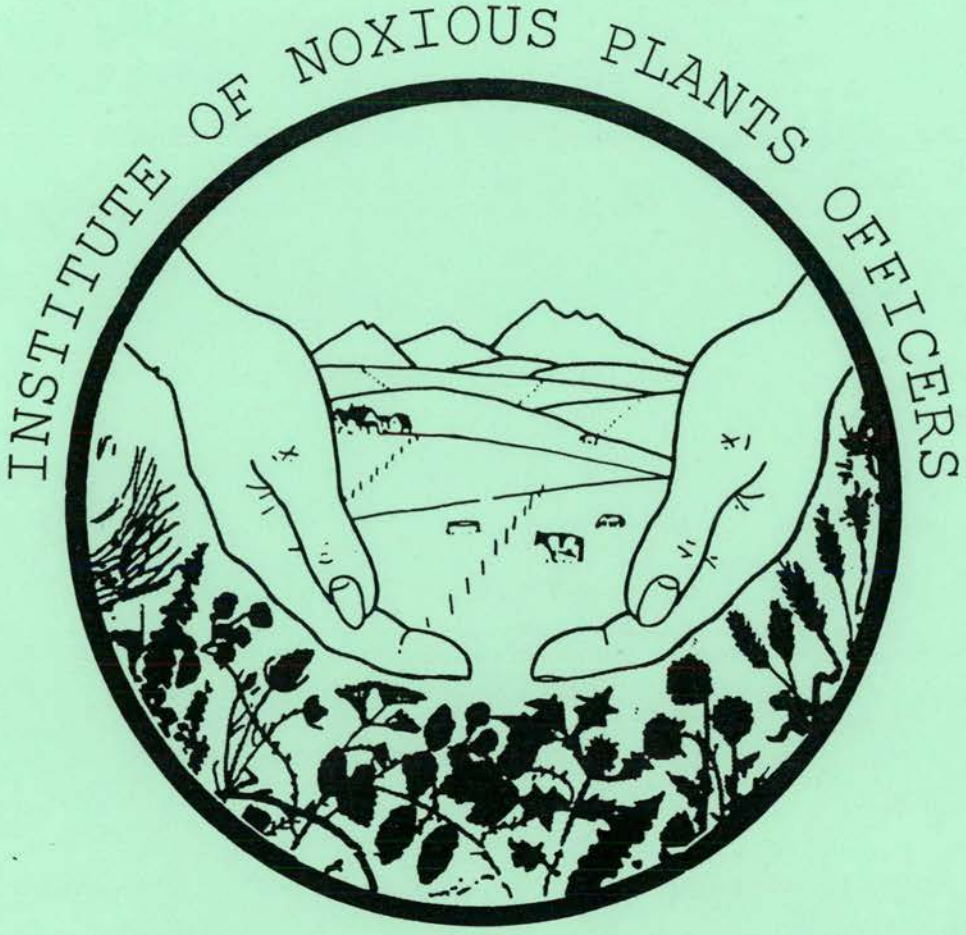

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INDEX

SUB EDITOR'S COMMENT

At last the Autumn issue of Protect. Hopefully we have included something for everyone. As you will note, the majority of material is relevant to what we do today within the Manawatu-Wanganui Region and the Hawkes Bay Region. If anyone wants further information regarding any of the content, please feel free to contact the author of the article.

We have included the occasional historical item, one that appealed to me was the article on the History, Biology and Control of Ragwort. We always did wonder where it came from - now we know. Doesn't Keith and Murray have a lot to answer for. My thanks to Dave Bayly, Wellington Regional Council and Paul Hatton, Manawatu-Wanganui Regional Council for keeping me on the straight and narrow in assembling this magazine.

Finally, while I know that Spring, Summer and early Autumn are our busiest time of the year, I must owe thanks to the Noxious Plants Officers throughout the three regions who gave some time to prepare articles for me, and to Billie in our Palmerston North office who put all this material through the word processor for me.

Bob Morgan
Noxious Plants Officer
Manawatu-Wanganui Regional Council
SUB EDITOR

TRUE ENVIRONMENTALIST

In 1854 the "Great White Chief" in Washington made an offer for a large area of Indian land and promised a "reservation" for the Indian people. Chief Seattle's reply, published here in full, has been described as the most beautiful and profound statement on the environment ever made.

CHIEF SEATTLE, CHIEF OF THE DWAMISH UPON SURRENDERING HIS LAND TO GOVERNOR ISAAC STEVENS IN 1854

The Great Chief in Washington sends word that he wishes to buy our land. The Great Chief also sends us words of friendship and goodwill. This is kind of him, since we know he has little need of our friendship in return. But we will consider your offer. For we know that if we do not sell, the white man may come with guns and take our land. The idea is strange to us. If we do not own the freshness of the air and the sparkle of the water, how can you buy them? Every part of this earth is sacred to my people. Every shining pine needle, every sandy shore, every mist in the dark woods, every clearing, and humming insect is holy in the memory and experience of my people. The sap which courses through the trees carries the memories of the red man.

So, when the Great Chief in Washington sends word that he wishes to buy our land, he asks much of us. The Great Chief sends word he will reserve us a place so that we can live comfortably by ourselves. He will be our father and we will be his children. So we will consider your offer to buy our land. But it will not be easy. For this land is sacred to us.

This shining water that lives in the streams and rivers is not just water but the blood of our ancestors. If we sell you land, you must remember that it is sacred, and you must teach your children that it is sacred, and that each ghostly reflection in the clear water of the lakes tells of events and memories in the life of my people.
The water's murmur is the voice of my father's father. The rivers are our brothers, they quench our thirst. The rivers carry our canoes, and feed our children. If we sell you our land, you must remember, and teach your children that the rivers are our brothers and yours, and henceforth give the rivers the kindness you would give your brother.

The white man's dead forget the country of their birth when they go to walk among the stars. Our dead never forget this beautiful earth, for it is the mother of the red man.

We are part of the earth, and it is part of us. The perfumed flowers are our sisters, the deer, the horse, the great eagle, these are our brothers. The rocky crests, the juices of the meadows, the body heat of the pony, and man - all belong to the same family.
The red man has always retreated before the advancing white man, as the mist of the mountain runs before the morning sun. But the ashes of our fathers are sacred.

Their graves are holy ground, and so these hills, these trees, this portion of the earth is consecrated to us. We know that the white man does not understand our ways. One portion of land is the same to him as the next, for he is a stranger who comes in the night and takes from the land whatever he needs. The earth is not his brother, but his enemy, and when he has conquered it, he moves on. He leaves his fathers' graves behind, and he does not care. He kidnaps the earth from his children. He does not care.

His fathers' graves and his children's birthright are forgotten. He treats his mother, the earth, and his brother, the sky, as things to be bought, plundered, sold like sheep, or bright beads. His appetite will devour the earth and leave behind only a desert.

I do not know. Our ways are different from your ways. The sight of your cities pains the eyes of the red man. But perhaps it is because the red man is a savage and does not understand. There is no quiet place in the white man's cities. No place to hear the unfurling of leaves in spring or the rustle of an insect's wings. But perhaps it is because I am a savage and do not understand. The clatter only seems to insult the ears.

And what is there to life if a man cannot hear the lonely cry of the whippoorwill or the arguments of the frogs around the pond at night? I am a red man and do not understand. The Indian prefers the soft sound of the wind darting over the face of a pond, and the smell of the wind itself, cleansed by a mid-day rain, or scented with the pinon pine. The air is precious to the red man for all things share the same breath - the beast, the tree, the man, they all share the same breath.

The white man does not seem to notice the air he breathes. Like a man dying for many days, he is numb to the stench. But if we sell you our land, you must remember that the air is precious to us, that the air shares its spirit with all the life it supports. The wind that gave our grandfather his first breath, also receives his last sigh, and the wind must also give our children the spirit of life.

And if we sell you our land, you must keep it apart and sacred, as a place where even the white man can go to taste the wind that is sweetened by the meadow's flowers. So we will consider your offer to buy our land. If we decide to accept, I will make one condition - the white man must treat the beasts of this land as his brothers. I am a savage and I do not understand any other way. I have seen a thousand rotting buffaloes on the prairie, left by the white man who shot them from a passing train.

I am a savage and do not understand how the smoking iron horse can be more important than the buffalo that we kill only to stay alive. What is a man without the beasts? If all the beasts were gone, men would die from a great loneliness of spirit. For whatever happens to the beasts, soon happens to man.
All things are connected.
You must teach your children that the ground beneath their feet is the ashes of our grandfathers. So that they will respect the land, tell your children that the earth is rich with the lives of our kin. Teach your children what we have taught our children, that the earth is our mother. Whatever befalls the earth, befalls the sons of the earth. If men spit upon the ground, they spit upon themselves. This we know: the earth does not belong to man, man belongs to the earth. This we know: all things are connected, like the blood which unites one family. All things are connected. Whatever befalls the earth, befalls the sons of the earth. Man did not weave the web of life, he is merely a strand in it. Whatever he does to the web, he does to himself.

But we will consider your offer to go to the reservations you have for my people. We will live apart and in peace. It matters little where we spend the rest of our days. Our children have seen their fathers humbled in defeat. Our warriors have felt shame, and after defeat they turn their days in idleness and contaminate their bodies with sweet food and strong drink. It matters little where we spend the rest of our days. They are not many. A few more hours, a few more winters, and none of the children of the great tribes that once lived on this earth or that roam now in small bands in the woods, will be left to mourn the graves of a people once as powerful and hopeful as yours.

But why should I mourn the passing of my people? Tribes are made of men, nothing more. Men come and go like the waves of the sea. Even the white man, whose God walks and talks with him as friend to friend, cannot be exempt from the common destiny. We may be brothers after all; we shall see. One thing we know, which the white man may one day discover - our God is the same God. You may think now that you own Him as you wish to own our land, but you cannot. He is the God of man, and His compassion is equal for the red man and the white. This earth is precious to Him, and to harm the earth is to heap contempt on its Creator. The whites, too, shall pass; perhaps sooner than all other tribes. Continue to contaminate your bed, and you will one night suffocate in your own waste.

But in your perishing you will shine brightly, fired by the strength of the God who brought you to this land for some special purpose, gave you dominion over this land and over the red man. That destiny is a mystery to us, for we do not understand when the buffalo are all slaughtered, the wild horses are tamed, the secret corners of the forest heavy with the scent of many men, and the view of the ripe hills blotted by talking wires. Where is the thicket? Gone. Where is the eagle? Gone. And what is it to say goodbye to the swift pony and the hunt? The end of living and the beginning of survival.

So we will consider your offer to buy our land. If we agree, it will be to secure the reservation you have promised. There, perhaps we may live out our brief days as we wish. When the last red man has vanished from this earth, and his memory is only the shadow of a cloud moving across the prairie, those shores and forests will still hold the spirits of my people, for they love this earth as the newborn loves its mother's heartbeat.

So if we sell you our land, love it as we have loved it, care for it as we have cared for it, hold in your mind the memory of the land as it is when you take it. And with all your strength, with all your mind, with all your heart, preserve it for your children, and love it ... as God loves us all. One thing we know. Our God is the same God. The earth is precious to Him. Even the white man cannot be exempt from the common destiny. We may be brothers after all. We shall see.

RAGWORT

HISTORY, BIOLOGY AND CONTROL

Ragwort is one of the best known and most easily recognised pasture weeds and its distribution, spread and control arouses more interest and concern among farmers, local bodies and Noxious Plants Officers than probably any other weed.

Because it was mentioned specifically in the 1950 Noxious Weeds Act - "ragwort is declared ... to be a noxious weed" - it has had more attention especially by dairy farmers than any other weed. To many people the term "noxious weed" is synonymous with ragwort.

It was first recorded in New Zealand in 1874 near Dunedin and was declared to be a noxious weed in the Weeds Act 1900. It is mentioned regularly in Department of Agriculture annual reports and in 1902 was described as "a handsome plant with handsome yellow flowers carried in dense masses, occupying many square miles in Southland and spreading throughout the Colony".

Under the Noxious Plants Act 1978 it was declared by a Gazette Notice 1979 to be a Class B Noxious Plant throughout New Zealand. (Class B Noxious Plants are ones which are considered serious enough to warrant control usually on a district basis with the owner and/or occupier planning a control programme in co-operation with the local noxious plants authority. Class A Noxious Plants by comparison, are a small group of weeds which, if uncontrolled, pose a threat serious enough to warrant control, and eradication on a national scale.)

As well as Ragwort, the 1979 Gazette Notice included 14 other weeds in Class B Group.

L J Matthews (Soil and Field Research, MAF) found it difficult to justify placing ragwort under special conditions in the 1950 Act, as there were many other equally serious weeds that he felt deserved similar consideration. He thought that the use of sodium chlorate in the early 1930's claimed successful control, the widespread nature of the weed and its toxicity to stock, were some of the reasons why it was regarded so seriously.

He also considered that between 1936 and 1942, studies on ragwort and its control were the most intensive on any weed in New Zealand and paralleled only by recent work on barley grass and on nodding thistle.

In 1958 an article in the Journal of Agriculture considered that "despite widespread interest, ragwort is not the serious weed that many people believe, and that in a high-producing well-managed pasture it is of slight importance."

Certainly a study of the Journal of Agriculture from 1900 to 1950 does not show any undue concern by numerous writers for ragwort nor its spread. It is mentioned fairly regularly - as a noxious weed - and there are several articles between 1933 and 1936 on successful control with sodium chlorate. Matthews' remarks on the undue emphasis upon the danger, the spread and the control of ragwort appear to be justified.

DISTRIBUTION

Ragwort is present mainly in the higher rainfall areas of both Islands and while land development on the North Island Central Plateau increased its spread it is today more a local, rather than a district, problem, confined to newly-developed blocks, steep country where cattle physically damage the pasture and where individual farmers make insufficient effort to control it.

In the North, Centre and East of the North Island, Matthews says that it is present on at least 1 million hectares, plus extensive areas in Northland and Taranaki. An adequate (for control) ratio of sheep to cattle is maintained in many districts and Matthews claimed in 1977, "that some four days annually are spent on ragwort control on high producing dairy farms of the Waikato, and that in developing areas, this figure is much higher".

SOILS, CLIMATE AND FERTILITY

While ragwort is widespread in New Zealand it grows best in the light rhyolite and derived soils of the North Island Central Plateau and adjacent districts. It needs good rainfall to spread, and seedling establishment is encouraged by high relative humidity such as occurs in the Waikato basin.

Like most weeds, ragwort does best where soil fertility is high, but if a good pasture sward can be maintained the chances of spread through seedlings is considerably reduced.

BIOLOGY

In waste areas, or left untouched, ragwort is usually a biennial - flowering, seeding and dying in the second year, and propagating by seed. Most plants die after flowering and seeding, but a few may persist for another season, especially perennial characteristics. Ragwort may spread by vegetative propagation and this may be encouraged, not only by stock grazing but also by attempted mechanical control - cutting, pulling, grubbing or by unsuccessful spraying. If ragwort flowers and seeds in a reasonably dense and vigorous pasture sward, infestation from seed is much reduced since few seedlings establish, and most that do are smothered by the pasture.

GROSS MARGINS, MAF FARM MONITORING REPORT JUNE 1994

Performance Indicators 1994/95

Gross Margins

AVERAGE DAIRY UNIT: 75HA	3 S/U per hectare
Gross Revenue	$170,000
based on:	48,000 kgs MS $3.15 Kg ($5.50 kg MF) + Sale of Stock
Gross Revenue	$ 2266.00 p/ha

RAGWORT CONTROL:

Level of Infestation: 33%
represents a loss of 1 stock unit p/ha

Loss of Revenue:	$ 755.30
Balance:	$ 1510.70
Cost of Ragwort Control p/ha Chemical, Labour	$ 159.00 p.a.
Total:	$ 1351.70
Loss of Revenue p/ha	$ 914.30
Cost of Ragwort Control - 75 ha	$11925.00
Total Loss of Production plus Cost of Control	$68,572.50
Estimated Expenditure - 1994/1995 75ha unit	$ 1,200.00

GROSS MARGINS, MAF FARM MONITORING REPORT JUNE 1994

Performance Indicators 1994/95

AVERAGE DAIRY UNIT: 75 HA	3 S/U per hectare
Gross Revenue	$170,000
based on:	48,000 kgs MS $3.15 Kg ($5.50 kg MF) + Sale of Stock
Gross Revenue	$2266.00 p/ha

RAGWORT CONTROL:

Level of Infestation: 5%
represents a loss of 0.15 stock units p/ha

Loss of Revenue:	$ 113.30 p/ha
Balance	$ 2152.70
Cost of Ragwort Control p/ha Chemical, Labour	$ 50.00 p.a.
Total	$ 2102.70
Total Loss of Revenue p/ha	$ 163.30
Cost of Ragwort Control - 75 ha	$ 3750.00
Total Loss of Production plus Cost of Control	$12,247.50
Estimated Expenditure 1994/1995 - 75ha unit	$ 1,200.00

Ragwort control by sheep and factors affecting its establishment in a bull beef system

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SUMMARY

Ewe hoggets set-stocked (SS) or mob-stocked (MS) at 1.5 or 3.0 stock units (su)/ha were used to control ragwort in a bull beef grazing trial. Of ragwort plants in 3.0SS pastures 72% died within 12 months with little or no flowering. By contrast, in cattle-only pastures 72% of ragwort plants died after having flowered and seeded. SS resulted in higher ragwort mortality than MS and 3.0 sheep su/ha resulted in higher mortality than 1.5 sheep su/ha. Plant height was greatest in cattle-only pastures; greater in MS than SS; and greater at 1.5 su/ha than 3.0 su/ha. MS reduced flowering, but encouraged plants to change from biennials to short-term perennials. SS hoggets reached 63 kg liveweight at 20 months and no liver damage was found. Set stocking cattle-pastures with 3 sheep su/ha gave good control of ragwort and offers the potential for marketing heavy weight young sheep, or the early breeding of replacement stock.

In a second trial, a number of different treading and defoliation treatments were imposed during August to help understand the factors influencing the establishment of ragwort. Subsequent germination of ragwort seedlings was monitored. Grazing and treading both caused large increases in ragwort germination compared with ungrazed control plots, though many of the seedlings subsequently died over summer. In a third trial to find when ragwort germinated during the year it was found that germination

is markedly reduced by the presence of pasture cover and summer dryness but was not reduced by cool winter temperatures.

INTRODUCTION

Ragwort is widespread throughout the world and is seen mainly in moist areas of New Zealand on cattle and deer farms. It is however, probably present on all types of farm in these moist areas. Ragwort behaves mostly a biennial plant, but can also behave as an annual or a short-term perennial.

Although chemical control in winter is most common means of controlling ragwort, legumes are adversely affected by the sprays. The cost of a herbicide and its application often precludes its use on less profitable farms. Mowing and chipping may prevent seeding but will usually create a high proportion of multi-crown perennial plants in the following year. Sheep readily browse ragwort in the rosette stage, whereas mature stems, having a lower palatability and nutritive value, are generally not readily browsed.

Ragwort is toxic to livestock at all growth stages but sheep have the ability to detoxify some of the alkaloid, thus enabling them to eat ragwort without acute toxicity. The toxic pyrrolizidine alkaloids are metabolised in the liver to active pyrrol derivatives which cause cirrhosis of hepatic cells. A liver damaged by ragwort poisoning has enhanced copper uptake. As a result, copper poisoning is a common symptom of excessive intake of ragwort. Acute poisoning is frequently found in young cattle fed ragwort-contaminated hay, but because the alkaloid is a cumulative toxin, prolonged intake of a low level of ragwort may also lead to chronic poisoning.

Our approach to controlling ragwort thus far, has been to manipulate sheep management and understand the factors most important in allowing ragwort to establish. This article will describe some

of these findings and indicate our plans for developing a fully integrated ragwort biological control programme.

Trial 1: GRAZING MANAGEMENT

Experimental

Fifteen 1 ha paddocks, in a 30 ha rotationally grazed bull beef finishing system at the AgResearch Ballantrae Hill Country Research Station near Palmerston North, were split into three replicates. Romney ewe hoggets at stocking rates of 1.5 and 3.0 sheep stock units per hectare (su/ha) as either set-stocked (SS) (1.5SS and 3.0SS) or mob-stocked (MS) (1.5MS and 3.0MS) managements were the four sheep grazing treatments. A cattle-only treatment was the control. Bulls entered the trial in April each year at 8 months of age at a winter stocking rate of 10.5 su/ha, and were grazed until 18-20 months of age.

During rotations of 30-50 days, cattle passed through paddocks with SS sheep. Sheep are mob-stocked in late October, mid December, early February and mid March. Each MS event lasted 4 days with sufficient sheep to total an annual stocking rate equivalent to 1.5 or 3.0 su/ha. Within each paddock 20 ragwort plants were tagged in June each year and their height, flowering stage, grazing damage and the number of main growing stems recorded until the plant died.

Results

Ragwort flowering and survival

The majority of 3.0SS plants died without flowering in the first year, whereas the same proportion of ragwort in the cattle-only treatment died after having flowered. At the lower sheep stocking rates, ragwort flowering was controlled to a large extent, but mortality was not as high as the higher sheep

stocking rate and many plants survived into later years, with some of them flowering during winter and spring, when sheep were not present.

It was not possible to determine the age of the plants at the start of this trial, but clearly many acted as biennials or perennials, especially under MS grazing and with sheep at 1.5 su/ha. This was probably because MS sheep suppressed or inhibited flowering, without exerting enough grazing pressure to kill all plants. Sheep management had little effect on the number of growing stems. This was surprising because other research suggested that multi-stem crowns developed where plants were chipped or mown. Maybe sheep grazed many of these plants before the trial started, multi-stemmed crowns, may have been already created, as plants often had 2-6 stems each.

Plant size

In cattle-only pastures, ragwort grew significantly higher (up to 800 mm at flowering) than in sheep-grazed pastures (Table 1). Maximum mean height of tagged ragwort plants was smallest in 3.0SS pastures where flowering was prevented. In MS treatments, ragwort grew to 200 mm before being first grazed by sheep in October. In mob-stocked pastures, ragwort recovered quickly from sheep grazing, but was regrazed, before flowering, back to a low level during summer. These plants remained in the range 20–400 mm. Of those plants surviving into the following year, those in the cattle-only treatment were again tallest. For no apparent reason few plants were grazed in 1.5SS in the second year. This contrasted strongly with data for the first year when all plants in 1.5SS were regularly grazed. Also during the second year many 1.5MS many plants were not heavily grazed. This was because the grazing of one paddock in December was left too late and ragwort plants had grown above grazing height of the sheep (approx. 1 m). Flowers subsequently developed above grazing height on these plants and seed was set. Plant diameter generally reflected the pattern seen in plant height measurements.

Table 1 Mean heights (mm) of tagged surviving ragwort plants (± Standard error of mean) in pastures following imposition of five grazing treatments.

Date	Treatment				
	1.5MS	1.5SS	3.0MS	3.0SS	Cattle only
Aug 1992	50 b (5)	75 a (5)	61 b (5)	34 c (5)	64 ab (5)
Feb 1993	217 b (22)	162 bc (22)	198 b (21)	110 c (28)	704 a (22)
Jul 1993	84 c (15)	147 ab (19)	86 bc (20)	51 c (29)	191 a (29)
Feb 1994	456 b (38)	639 ab (58)	178 c (51)	225 c (86)	774 a (112)

Means within rows having different letters are significantly different ($P<0.05$).

Sheep performance

The ewe hoggets used in this trial gave very good ragwort control and reached 63 kg at 20 months. Although old sheep are often used for ragwort control so as to avoid chronic toxicity, livers of three SS and six MS 20-month sheep from this trial showed no sign of liver cirrhosis. Care is recommended, however, if one mob of sheep is to be used continually in a MS regime to control tall dense ragwort. Their intake of the toxin will be much higher than that in our MS sheep which grazed dense ragwort infestations over only short intervals and would have had only a low intake of toxin.

Not all sheep eat ragwort. We have found that around 10-15% of sheep are reluctant ragwort eaters. In selecting hoggets for restocking our trial it was important that we selected only known ragwort eaters. Farmers have also said that sometimes large mobs of sheep will avoid ragwort. This supports one experience we had at Ballantrae where mixed-age Merino wethers gave very poor ragwort control. A trial is currently in progress to try and determine why some sheep are reluctant eaters of ragwort, and also to see whether there is any potential to train reluctant eaters into becoming "eaters".

Trial 2: TREADING AND DEFOLIATION EFFECT ON GERMINATION

Experimental

A hill pasture dominated by browntop was split into three blocks, each with six treatments involving various combinations of treading or not treading, grazing or not grazing, and removal of all pasture or leaving the pasture cover intact (Table 2). Treading and grazing was done by 27 heifers run a stocking rate equivalent to 205 heifers/ha. Grazing involved defoliation from a pasture cover of 2100 kg DM/ha (12 cm height) down to 700 kg DM/ha (2.5 cm height). Grazing-without-treading was achieved by heifers grazing underneath electrified wires, while treading-without-grazing was achieved by walking animals around the plot without letting them stop to graze. Areas which were to be neither grazed nor trodden were protected by cages. For treatments where pasture cover was removed, foliage was clipped to ground level once then left to regrow.

Seedlings emerging within two 0.4 x 0.4 m quadrats were counted 5, 15 and 22 weeks after treatment application. All plots were grazed with young bulls 8, 14 and 19 weeks after treatment imposition and thereafter with ewes. Ragwort seedlings within quadrats were not defoliated by the livestock. After the final count, four soil samples (each 5 cm diameter and 2 cm deep) were taken from each quadrat and placed for 30 days in thin layers under an automated mist irrigation system in a glasshouse with an average temperature of 20°C to encourage all remaining ragwort seeds to germinate. Seedling emergence was calculated as a percentage of the total number of seeds estimated to be initially present in the soil.

Results

Pasture disturbance and germination

An average population of around 3000 viable seeds/m^2 was estimated to be present in the top 2 cm of soil at the start of the trial. The complete and dense pasture cover in the undisturbed treatment limited

emergence of ragwort seedlings to <1% of this potential. All three forms of disturbance caused significant increases in ragwort seedling emergence (Table 2). Complete removal of the pasture cover stimulated the greatest increase in seedling emergence, but treading and grazing also stimulated emergence of ragwort seeds, but to a lesser extent.

This stimulation of ragwort germination and emergence by all three forms of disturbance could be explained entirely by the removal of pasture cover. The reduced cover allowed seeds in the soil to be exposed to a higher intensity of light. We know from other work that light, especially of a particular quality, stimulates ragwort germination. Treading retards pasture regrowth by damaging plants and compacting soils, thereby allowing more light onto the seeds. While treading would have buried some seeds, it is probable that others were exposed. The net effect of treading on germination of ragwort was apparently additional to the effect of physical removal of cover alone.

Table 2 Emergence of ragwort seedlings 5 and 15 weeks after pasture disturbance, and seedling mortality between the 15th and 22nd weeks after treatment.

Treatment			% Seeds which emerged		% Seedling
Grazing	Treading	Cover	After 5 weeks	After 15 weeks	mortality by late January
o[1]	+	o	27.5 a[2]	25.5 a	68 *[3]
o	o	o	20.1 ab	20.6 ab	75 ns
o	+	+	10.9 bc	14.9 ab	58 *
+	+	+	7.8 bc	12.3 b	66 *
+	o	+	6.0 c	11.1 b	74 *
o	o	+	0.1 d	1.2 c	100 ns

[1] Symbols signify presence (+) or absence (o) of grazing, treading or cover for each treatment
[2] Mean values within a column sharing the same letter are not significantly different (P>0.05).
[3] Asterisks denote significant (P<0.05) decreases in seedling numbers; ns = decrease in seedling number not statistically significant.

The high seedling mortality in all treatments from 15 to 22 weeks (summer, Table 2), was thought to be due mainly to competition from pasture plants which had recovered fully from all treatments. Thus although severe pasture disturbance can result in greatly increased germination of ragwort, good pasture management in following months may allow the seedling populations to be reduced again.

The importance of maintaining good pasture cover as a means of reducing ragwort invasion cannot be over emphasised.

Trial 3: PERIODICITY OF EMERGENCE

Experimental

At the same site as Trial 2, ten 0.4 x 0.4 m quadrats were randomly selected each month from August until July and enclosed by cages to prevent grazing. Five quadrats had all vegetation removed by applying a 4.8 g/litre solution of glyphosate (Roundup) to prevent regrowth, then clipping to ground level 1 week later. Pasture was left intact in the other five quadrats. Seedling emergence was counted 4 weeks after clipping of vegetation. Soil moisture at the site was monitored weekly by calculating the gravimetric water content of soil samples. Average soil temperature at 10 cm was recorded daily at a nearby weather station.

Results

Differences in seedling emergence between intact pasture and bare-soil plots were clearly seen in this periodicity trial, being significant at all times except in February when very few seeds emerged in either treatment. Prior to February, seedling emergence from the plots covered by pasture was on average only 3.7% of that from bare ground.

Where ragwort seed germination was not being inhibited by pasture cover, there was a gradual decline in emergence from spring through to late summer followed by an increase to July (Table 3). The decline can be explained by the strong correlation between seedling numbers and soil moisture. Germination declined as soil temperature rose. Typically an increasing temperature up to 20°C should have increased germination rate, but limiting soil moisture appears to have over ridden this effect.

Dry soils appear to offer the only respite for farmers to get ragwort back under control. The ability to germinate at any time accounts for bad infestations in pastures which have been winter-sprayed with herbicide.

Table 3 The effect of time of year on ragwort seedling emergence from bare and pasture-covered soil.

Month when cover removed	Soil moisture (%)	Soil temperature (°C) at 10 cm	Number of seedlings/m^2		
			Bare ground	Pasture intact	Difference[2]
August	48	8	446 a[1]	6	**
September	51	9	600 a	21	*
October	46	13	466 a	5	**
November	49	15	264 ab	12	**
December	34	17	169 b	11	**
January	31	19	50 b	2	*
February	25	20	3.7 c	2	ns
March	14	16	0 c	0	ns
April	22	14	59 b	0	*
May	24	11	238 b	5	**
June	30	9	642 a	5	**
July	31	8	511 a	5	**

[1] Means sharing the same letter are not significantly different ($P > 0.05$)

[2] Differences between bare and covered ground with ** differ significantly at $P < 0.01$, those with * differ only at $P < 0.05$ but not $P < 0.01$, those with ns do not differ at $P > 0.05$

FUTURE RESEARCH

Landcare Research has introduced ragwort flea beetle to many areas of New Zealand. Early indication are that ragwort might be severely affected by this biological control insect. Certainly, if American experience can be extrapolated to New Zealand, then this insect will be a major new weapon in our arsenal against ragwort. New work between AgResearch and Landcare Research will look at integrating sheep and flea beetle into a fully integrated ragwort biological control programme. We will be looking at ways to maximise the benefits of each, and at whether there is any potential to implement such a system into dairy farming enterprises! This heresy may soon become a necessity if non-trade tariffs are applied by our major clients, or if (when?) ragwort resistance to herbicide develops.

Conclusion

These trials demonstrate that pasture and stock management can be used to control ragwort in pasture, without resorting to herbicide use. By using approximately 20-30% of total stock units as sheep, ragwort will largely be prevented from reseeding in a cattle enterprise badly infested with ragwort. Management to maintain dense pasture cover when soils are moist will minimise establishment of mature ragwort plants, but this is not easy to achieve in cattle systems! It is interesting to speculate whether a management strategy of purposely disturbing the soil to maximise ragwort germination, followed by sheep grazing to control ragwort growth, can be used as a means of rapidly depleting the soil reserves of ragwort seed.

SOME OF THE PAST HISTORY

My contribution to 'Protect' Autumn edition which some newer and even older members may find interesting. Namely a copy of my May 1975 report to the Kiwitea County Council.

"Since 7 April, work completed in the County included the following: clearing roadsides, 2 days; work on Council land, 1 day; inspection of Crown Land, 3 days; time spent on private properties; 16 days.

Regarding private properties, it is proposed to classify each property, after inspection, into one of four categories. These categories and their definitions are as follows. Category A - properties free or virtually free of all noxious weeds. Category B - properties which have some noxious weeds but where the situation is considered under control and the weeds are confined to either waste areas or are treated on an annual basis. Category C - properties which obviously have weed problems and where the owner is making some effort to control/or eradicate but could be doing more. Category D - properties with an obvious weed problem where little or no effort is being made to control/eradicate. Properties placed in the last two categories are the obvious ones for concern and where most attention should be focused.

For a start, it has been decided to inspect thoroughly approximately 5,000 acres in each Riding. It is felt that it is better to be seen and to spend a small amount of time in each Riding initially rather than work through each Riding completely as this latter course could mean a wait of up to two years before all farmers in the north and last Riding had their properties inspected. After this initial inspection of each Riding is completed, a start will then be made on finishing the remainder of properties in each Riding, with all placed in their various categories along with their predominant weed. Once all properties are inspected and categorised, follow up inspections will be maintained mainly on the properties in the (C) and (D) Categories and to a lesser extent in the (B) Category while the (As) will be left largely alone except for the occasional inspection. For those in (D) Category suitable action will be taken against those who are not prepared to co-operate in attempting to control/eradicate their weeds while those in (C) Class will be persuaded if and where possible to carry out more work than they are already doing. It is visualised to inspect these two Categories at least twice a year while those in (B) should be inspected every 1/2 years while (a) when time allows.

Owing to other commitments such as roadside spraying, Crown Land spraying and Ranging duties, it is expected to take at least two years to inspect all properties in Kiwitea County. Depending on the actual terrain of each property, the average acreage covered each day will vary from 500 acres from mainly steep hill country land to 1200 acres of mainly flat arable land.

The following properties have been inspected and categorised. In the Kimbolton Riding, 7 days were spent inspecting 11 properties and covering 4953 acres!

In practically all cases, the farmers met so far have expressed cordiality and co-operation.

Ranger's Report - Wandering Stock

There is nothing to report in regard to wandering stock this month.

B R Drake
Noxious Weeds Inspector/Ranger

13 May 1975"

For All Those Born Prior to 1950

Supplied By John Barrett, Tauranga.

We are survivors. Consider the changes we have witnessed; we were born before television, before penicillin, before polio shots, frozen foods, Xerox, contact lenses, frisbees and the pill. We were before radar, credit cards, laser beams and ball point pens; before pantyhose, dishwashers, clothes driers, electric blankets, air conditioners, drip-dry clothing and before man walked on the moon.

We got married first, and **then** lived together. How quaint can you be? We were before house-husbands, gay rights, computer dating, dual careers and computer marriages. We were before day care centres, group therapy, and nursing homes. We had never heard of FM radio, tape decks, electric typewriters, artificial hearts, word processors, yoghurt and guys wearing earrings. For us time sharing meant togetherness, not computers or condominiums; a "chip" meant a piece of wood, hardware meant hardware and software wasn't even a word.

In 1950 "Made in Japan" meant junk, and the term "making out" referred to how you did an exam or interview. Pizzas, McDonalds and instant coffee were unheard of.

In our day cigarette smoking was fashionable, grass was mown, coke as a cold drink and pot was a thing you cooked in. Rock music was Grandma's lullaby and AIDS were helpers in the Principal's office.

We were certainly not before the difference between the sexes was discovered, but were surely before the "sexchange". We made do with what we had, and were the last generation that was so dumb as to think you needed a husband to have a baby.

No wonder that we are so confused and that there is such a generation gap.

But we survived! What better reason to celebrate. Cheers!

ITALIAN ARUM OR ARUM ITALICUM

Bob Morgan, Noxious Plants Officer, Manawatu-Wanganui Regional Council

A real mongrel of a plant, has leaves about 20 cm long which are widest at the base, dark green with very distinctive cream markings along the veins. It is a perennial growing in thick clumps with extensive roots, and it reproduces from seeds and bulbs.

Most of us know what it looks like and that it is a difficult plant to control or eradicate.

This is the plant that a local landowner asked our advice on eradication methods. As can be seen by the photographs in Appendix B he had a major problem. Part of the area used to be an old house site, when the house was demolished the area was cultivated and planted in spuds. The cultivation was the start of his problem as this well and truly divided and redistributed the bulbs. Unfortunately that was not the end of it. The natural gas line was being laid in that area and consequently was ploughed straight through the Arum block, once again dividing and redistributing bulbs up to 1000 metres from the original site.

Now we have approximately 5 hectares of 100% cover of Italian Arum. It is also very apparent that this is spreading quite quickly.

On investigation we found there was very little information available for the control of Arum, even from the chemical companies. Although all were sure their product would be effective.

It was decided that the only way to find some answer was to lay a number of trial sites that would be aimed at eventual total control. It was realised that to achieve total control we would require something that would give us bulb rot.

As the photographs Appendix C indicate, six plots were laid out then divided in half. Half of each plot was topped using a weed-eater and slash was cleared from those plots.

Chemicals applied were:

Plot 1	A & B	Diesel	2 litres	28.9.95
Plot 2	A & B	Escort	5 grams to 10 litres	28.9.95
Plot 3	A & B	Grazon	250 mls per hectare	28.9.95
Plot 4	A & B	Roundup	200 mls per 10 litres	28.9.95
Plot 5	A & B	Velpar	15 grams per 10 litres	28.9.95
Plot 6	A & B	24D	250 mls per hectare	28.9.95

Pulse was used only with Escort. Each plot had ground temperature, air temperature, wind direction, soil moisture content and soil type recorded.

14 days after chemical application it was found that on all plots some yellowing and wilting of green growth was appearing.

On 16 November 1995 a further inspection was carried out and it was found that:

Plot 1, Diesel - 100% removal of grass and lily, however new growth of lily was already appearing. No bulb rot.

Plot 2, Escort and Pulse - 80% of lily removed along with 100% of grasses. New lily growth was appearing, and there was only minor indication of bulb rot.

Plot 3, Grazon - 100% removal of all lily leaf and substantial bulb rot. Grass growth was appearing. No regrowth of lily.

Plot 4, Roundup - 100% removal of lily leaf and grasses. No significant bulb rot. Lily regrowth apparent.

Plot 5, 24D - 60% lily leaf removal. No grass damage. No bulb rot.

Plot 6, Velpar - 60% lily leaf removal. 100% grass damage. Minor bulb rot.

It was apparent that it was not necessary to top this plant as the end results were the same cut or uncut. It would appear that from this first year's trial results, Grazon applied at 250 mls per hectare does give a very clean removal of all leaf growth, grasses reappear very quickly, and there is substantial bulb rot.

Trials will continue in the 1996/97 spring and summer and, at this stage, we will spray the majority of the area with Grazon at 250 mls per hectare using CDA equipment on a three year programme. Hopefully at the end of three years we will have achieved total control.

However, we will also be looking at trial plots aimed at reduction in Grazon, ie 200 mls and 150 mls. We will also be looking at trial plots using Tordon 50D and Tordon Brushkiller.

Appendix

A	Map of area
B	Scope of problem
C	Plots with Grazon results appearing

ITALIAN ARUM *(Arum italicum)*

Resembling the common garden arum lily but much smaller. Leaves about 20cm long, widest at the base, dark green with distinctive cream markings along veins. A perennial growing in clumps from extensive roots, and reproducing from seeds and bulbs similar to oxalis bulbs.

Italian arum grows wild, especially in the North Island, in shady situations, near buildings and hedges and to some extent in good pasture in the open. Its control is difficult. Italian arum is not readily eaten by animals but is suspected of killing some, although it is regarded as much less poisonous than *Arum maculatum,* which does not grow wild in New Zealand.

ARUM

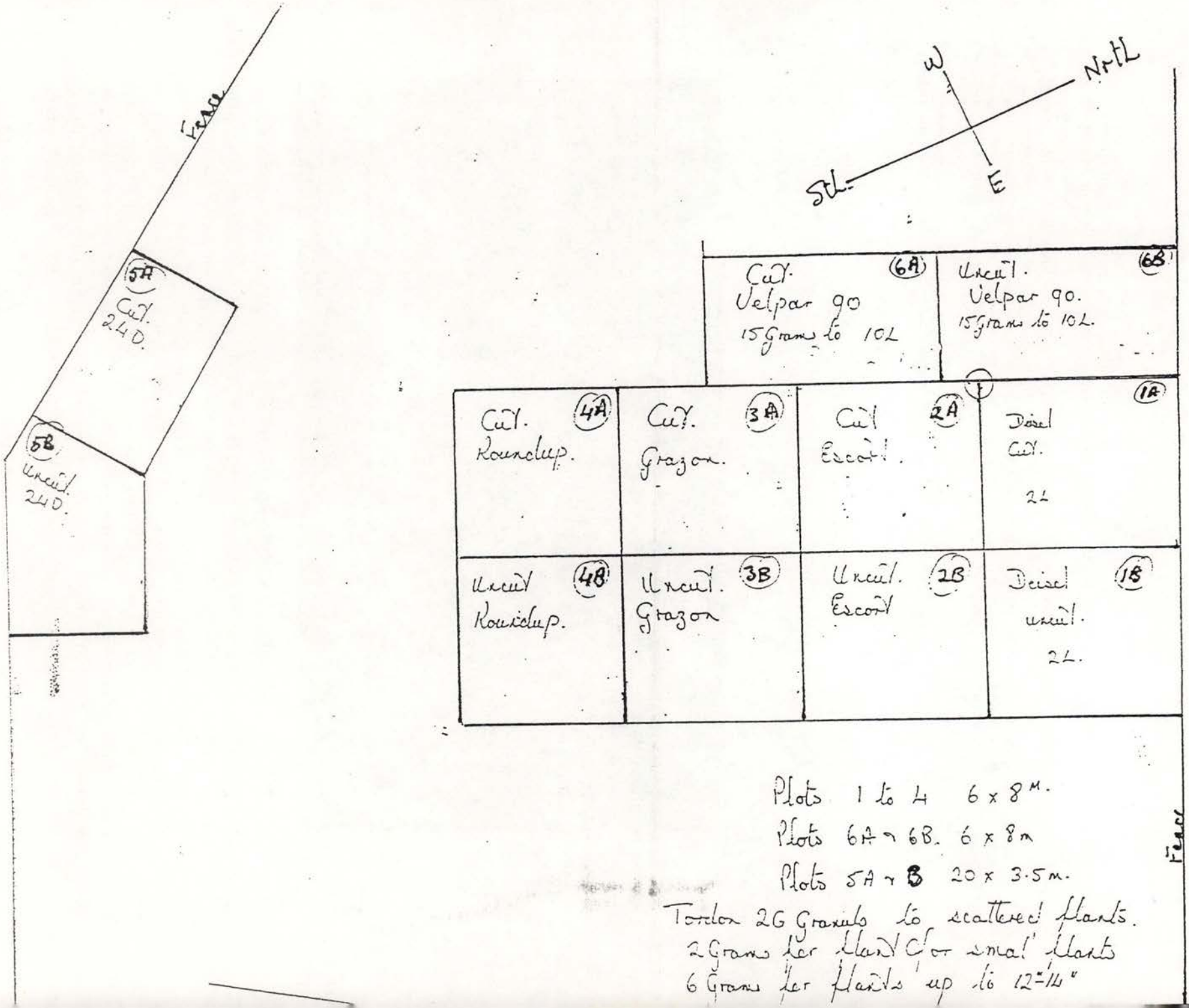
Botanical name: *Zantedeschia,* several species. (Photo—*Z. melanoleuca*)
These are often called arum lilies, but are not true lilies.

Description: Leaves and stalks fleshy. The flower consists of a white petal-like sheath (spathe) surrounding a yellow-tipped spike bearing the florets. Others of this family have various coloured spathes, while *Arum italicum,* Italian arum, has conspicuous orange berries on a stalk after the leaves die back in the autumn. Others of the Araceae which are possibly poisonous are *Caladium, Colocasia, Philodendron, Dracunculus, Arisaema.*

Toxin: Although crystals of calcium oxalate are present, the real toxin may be a histamine releasing protein-like substance.

Symptoms: Burning pain in mouth, throat, and stomach; thirst, nausea, vomiting, diarrhoea. Death can occur through shock, convulsions, exhaustion.

APPENDIX A


Fence
5A
Cul.
24D.
5B
Unsuit.
24D.
W
Nrth
Sth
E
Cul. 6A
Uelpar 90
15 Grams to 10L
Unsuit. 6B
Uelpar 90.
15 grams to 10L.
Cul. 4A
Roundup.
Cul. 3A
Grazon.
Cul 2A
Escort.
Diesel 1A
Cul.
2L
Unsuit 4B
Roundup.
Unsuit. 3B
Grazon
Unsuit. 2B
Escort
Diesel 1B
unsuit.
2L.
Plots 1 to 4 6 x 8M.
Plots 6A & 6B. 6 x 8m
Plots 5A & B 20 x 3.5m.
Tordon 2G Granule to scattered plants.
2 Grams per plant for small plants
6 Grams per plants up to 12"-14"
Fence.

APPENDIX B

APPENDIX C

PURPLE LOOSESTRIFE

(Lythrum salicaria L.)

Purple lythrum *(Lythrum salicaria L.)*, more commonly known as purple loosestrife, is an emergent aquatic plant of Eurasian origin. An erect, herbaceous perennial, it became established in the estuaries of northeastern North America by the early 1800s. It has since spread across mid-latitude North American wetlands. Several modes of colonisation or escape are probable, including ships' ballast, livestock bedding and forage, wool and purposeful import as seeds or rootstocks for gardens and herb beds.

Purple loosestrife was first found in 1929 in the Puget Sound area of Washington. Now widespread east of the Cascades, it is less prevalent west of the Cascades. It flourishes in some rivers and irrigation projects in the Okanogan and Yakima valleys and in the Columbia Basin in Washington, the Columbia Basin, Snake River and Owyhee River areas of eastern Oregon and the Snake River and Boise River areas of western Idaho.

IDENTIFICATION

The name *loosestrife* has been associated with several members of the loosestrife family *(Lythraceae)*, also with the genus *Lysimachia* in the primrose family *(Primulaceae)*. Although *L. salicaria* has more than 10 common names in America and Great Britain, the most established name is *purple loosestrife*.

Purple loosestrife is identified most easily during its long season of bloom. At this time, people can recognise the characteristic purple-magenta floral mass easily at 100 yards. It may be confused with fireweed *(Epilobium angustifolium)*, blue vervain *(Verbena hastata)*, and spirea *(Spiraea douglasii)*. Upon closer examination, subtle differences in colour and floral structure among these plants make positive field identification easy.

Differences in site preference also help to separate purple loosestrife from superficially similar species. Usually loosestrife grows on moist or saturated soils. Also, it is the only purple-magenta flowered plant to develop massive monospecific blocks of showy floral displays over large wetland tracts.

In early autumn, a distinctive but temporary colour change usually occurs after the growing season when leaves dry and turn bright red. The red colour may persist for 10 days. Dead stalks remain standing through winter and have a characteristic brown tone that, in combination with spire-shaped capsule clusters, readily identify the species.

PURPLE LOOSESTRIFE

Lythrum salicaria

Seedlings

Flower

Leaves

Habitat

Purple Loosestrife will grow on wet soil to shallow water, stream and river banks and lakes shores, grazed with cattle, will control the plant.

Upright hardy perennial, bushy, up to two meters tall.

The flowers are purple-magenta colour and are numerous on a long spike, five to six petals per flower. Flowering Jan/Feb in Horowhenua.

Leaves usually opposite, linear shape and smooth edges. Attached directly (no stalk) to a four sided stem.

The roots are woody taproot with fibrous root system that forms a dense mat.

It is a prolific seed producer, also grows from underground root and sprouts from broken-off plant parts.

Height

MANAWATU WANGANUI REGIONAL COUNCIL.

for a better environment

N.D.P. 01/96

WANTED

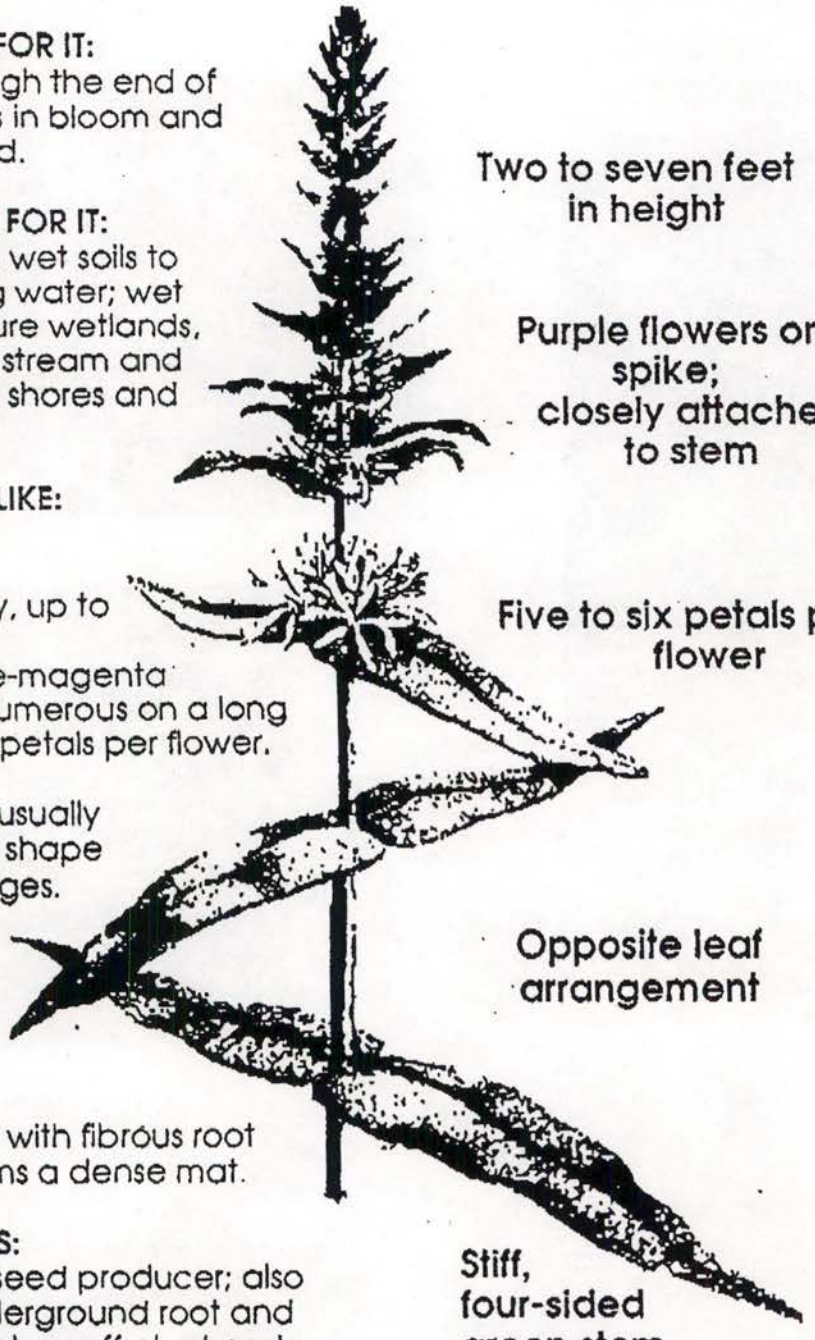
The Eradication of

WHEN TO LOOK FOR IT:
August through the end of February when it is in bloom and easily recognized.

WHERE TO LOOK FOR IT:
It is present on wet soils to shallow standing water; wet meadows, pasture wetlands, cattail marshes, stream and river banks, lake shores and ditches.

WHAT IT LOOKS LIKE:
Growth Habit
Upright hardy perennial, bushy, up to seven feet tall.
Flowers Purple-magenta color. Flowers numerous on a long spike; five to six petals per flower.
Leaves
Vary, although usually opposite; linear shape and smooth edges. Attached directly (no stalk) to a four-sided stem.
Roots
Woody taproot with fibrous root system that forms a dense mat.

HOW IT SPREADS:
It is a prolific seed producer; also grows from underground root and sprouts from broken-off plant parts.



Purple Loosestrife

Lythrum salicaria

Usually purple loosestrife leaves grow opposite each other on the four-sided (sometimes six-sided) stem. Leaves are linear with smooth edges and do not have a petiole or leaf stem. The leaves are more or less covered with fine hairs.

The purple-magenta coloured, five- to six-petalled flowers grow on long spikes. Seeds develop in capsules that dehisce when mature, releasing the seed. Purple loosestrife seed production depends on plant age, size and vigour. A 4 to 5-year-old plant with 30 stems reportedly can contain about 1,000 capsules per stem and 90 seeds per capsule, producing an estimated 2,700,000 seeds.

A mature, well established purple loosestrife plant often grows up to 10 feet tall and 5 feet wide. Thirty to 50 herbaceous stems arise from a common rootstock to make the graceful, wide-topped crown characteristic of the older clumps. Although lateral root crown growth offers new sites of origin for peripheral stems, purple loosestrife does not spread far by its roots. The roots are not the creeping type.

BIOLOGY

Purple loosestrife is a prolific seed producer and spreads primarily by floating seeds. The type of watershed strongly influences the rate and ease of expansion of a local infestation. Slow-moving streams with broad alluvial deposits offer many sites for wetland plants to colonise. These areas are highly susceptible to purple loosestrife infestation and spread. Streams and wetlands having shade-covered banks are less susceptible to invasion. Spread into other areas may have occurred from seed transported by highway and recreational vehicles, birds and other animals, including people. Seed maintains viability of over 80% for at least 3 years.

Judge habitat vulnerability to invasion by purple loosestrife by existing plant associates. Presence of cattails, reed canarygrass, sedges, or rushes in marshy areas or along riparian wetlands identify an invasion prone habitat. Impacts on native vegetation have been disastrous; purple loosestrife is a vigorous competitor and can crowd out native vegetation, completing dominating a site. Although it can invade somewhat undisturbed habitats, the spread and dominance of this weed accelerates greatly in disturbed habitats. Impacts on wildlife have not been well studied; however, purple loosestrife appears to reduce waterfowl and aquatic fur bearer activity severely.

CONTROL

The shallow woody root system forms a dense mat, making it difficult to pull established plants. The plant will resprout if you do not remove the entire root. Plants under a year old are easier to control by pulling.

If you mow plants, cut stem pieces can send out roots and establish new plants. Frequent mowing may be effective if the cut stems dry rapidly. Purple loosestrife is not a threat to most cultivated crops. Large perennial rootstocks lie mostly within 12 inches of the soil surface and are susceptible to any form of crop culture that

Conclusions

The economic returns from clearing gorse covered land and planting *Pinus radiata* are significantly more profitable in the long term then trying to retain pastoral productivity through periodic gorse control. A two spray and burn land preparation programme followed by high initial stockings of *Pinus radiata* should not only suppress gorse regeneration but form the basis for a forestry regime aimed at producing maximum clearwood. Some pastoral grazing after year three will also be possible. The initial investment of clearing the land and undertaking the appropriate silvicultural works will return the land owner the equivalent of investing $435 per annum for 27 years at 8% per hectare. This is comparable to more than 18 stock units per hectare when prior to the land being cleared from gorse it may have been running less than 5 stock units.

Grow more wood in less time

includes annual tillage. However, cranberry bogs, wild rice beds, and riparian meadows in the Pacific Northwest may be highly susceptible to invasion.

No biological control agents have been found, but the plant may lend itself to successful biological control in the future. Livestock graze early foliage but utilise the mature plant less, giving plants a growth advantage over more palatable species.

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COMPILED BY: Noel Procter
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Manawatu-Wanganui Regional Council

PROFITABILITY ANALYSIS OF CLEARING GORSE LAND AND PLANTING PINUS RADIATA

Dave Sutherland
Noxious Plants Officer
Manawatu-Wanganui Regional Council

Summary

The clearing of gorse covered land and replanting using *Pinus radiata* is shown to be significantly more profitable in the long term than retaining the area in gorse and having a considerably lowered pastoral grazing ability.

Introduction

Generally gorse covered land throughout the Region has negligible financial returns to the land holder and in some cases it may be costing money to farm. The objective of this exercise is to examine the associated costs and returns from an appropriate regime that converts a hypothetical 10 hectare hill country block of "old man's" gorse covered land to *Pinus radiata* forestry.

Gorse Eradication Programme

It is proposed to eradicate the gorse using the following programme:

Operation	Timing
Aerial helicopter spraying using *Grazon* for total kill	November- December
Burning	February- March
Pre-plant helicopter spray using *Grazon* to kill regrowth	April-May

In order to suppress any gorse seedling regeneration and to enable possible grazing after three years, it is proposed to oversow the area using a seed mixture containing Maku Lotus and grass species.

Forestry Regime

The following forestry regime is proposed for gorse regeneration control:

Operation	Timing (age)
Planting 1350 stems per hectare (spha)	0
Pruning 350 spha to 2.2 metres	5
Pruning 325 spha to 4.2 metres	6.5
Thinning to waste leaving 600 spha	6.5
Pruning 300 spha to 6.5 metres	8
Thinning to waste leaving 300 spha	8

This regime is aimed at producing clearwood to maximise the returns while still maintaining gorse regeneration control.

The higher initial stocking rate and the delayed first thinning until the second pruning operation is aimed at suppressing any gorse regeneration. Gorse suppression until the completion of the silvicultural works will enable easier access through the block.

It is proposed that this regime will run for 27 years and the expected returns from clearfelling after logging and cartage costs have been extracted will be $60,000.

Costings

The costings for each operations are expressed on a per hectare and per 10 hectare basis. The costings per 10 hectares are compounded forward at 8% from the time they occur until year 27 to give its future value.

Land preparation costs:

All land preparation costs occur at year 1.

Operation	Costing per hectare	Costing per 10 hectares	Future Value
First spray *Grazon* 10 litres/ha @ $55/litre	$550	$5,500	($43,934)
Helicopter Application	$123	$1,230	($9,825)
Burning	$10	$100	($799)
Pre-plant spray *Grazon* 3 litres/ha @ $55/litre	$165	$1,650	($13,180)
Helicopter Application	$123	$1,230	($9,825)
Oversowing	$260	$2,600	($20,769)

Planting costs:

These costs occur during year 1.

Operation	Costing per hectare	Costing per 10 hectares	Future Value
Seedlings (1,350 @ $0.190 each)	$265	$2,655	($21,208)
Planting (1,350 @ 0.185 each)	$250	$2,500	($19,970)
Release spraying, chemical and labour (1,350 @ $0.120 each)	$162	$1,620	($12,941)

Silvicultural costs:

Operation	Year	$/hectare	$/10 hectares	Future Value
First pruning to 2.2 m (prune 350 spha @ $0.90)	5	$315	$3,150	($17,125)
Second pruning to 4.2 m (prune 325 spha @ $1.10)	6	$358	$3,575	($17,996)
First thinning (leaving 600 spha @ $180/ha)	6	$180	$1,800	($9,061)
Third pruning to 6.5 m (prune 300 spha @ $1.30)	8	$390	$3,900	($16,831)
Second thinning (leaving 300 spha @ $160/ha)	8	$160	$1,600	($6,905)

Financial Analysis

The total future value of all compounded costs to year 27 equate to $220,369 for the 10 hectare block. An earlier assumption was that the revenue to the land holder from the sale of logs at year 27 was $600,000 for the block (after logging and transport costs were subtracted). Therefore, the net profit to the land holder once the associated costs of realising this $600,000 is $379,631. This is equivalent to $379,631 per hectare.

To achieve $379,631 after 27 years from annual investments at 8% requires an annual investment of $435 for 27 years. Associated with this investment, the landholder will still have 10 hectares of gorse.

When comparing this return to livestock, although the total livestock per hectare when the land is covered with gorse is minimal, and if one stock unit is equivalent to $24.00, then $435 is equivalent to 18.1 stock units. These figures do not take into account the possible grazing available from year three to about year 10. Consequently the returns from forestry, even if the land requires capital expenditure to clear it from gorse, is significantly more profitable than pastoral farming.

THE PURPLE PLAGUE

The person responsible for planting Heather in the Central North Island dreamed of a picturesque game-shooter paradise which has turned into a conservationist's nightmare.

For the next several months some 60,000 ha of foothills and rolling downlands in the central North Island mountains of Ruapehu, Ngaruhoe and Tongariro will be a mass of beautiful purple bloom. Thousands of New Zealand and international tourists will boggle at the breathtaking loveliness of a vast sea of colour which basks in the autumn sun, and slowly fades into a mauve haze backed by the towering peaks of Tongariro National Park.

But for the Department of Conservation, the splendour of those slopes is soured by the fact that the sweeping waves of purple signify invasions by an insidious weed. Heather is rapidly invading large areas of the country's oldest and most popular National Park.

Dubbed the "Purple Plague" by Conservation Officers, Heather was introduced into the National Park in 1912 by a close friend of Prime Minister Walter Massey, Police Commissioner John Cullen who was an honorary park warden. Cullen had ideas of developing the sweeping foothills of the central North Island mountains into the equivalent of a Scottish moor, and to introduce grouse and other fancy game birds to provide plenty of sport for shootists.

Large scale plantings began in 1913 with seed from a variety of places, including Scotland and France. A Police Constable from Raurimu and prisoners from nearby Rotoaira Prison did much of the planting, which totalled some 1200 ha's by 1918.

In 1927, after years of argument, the National Park Board declared that native plants and animals must be protected against the Heather which was then seen as a threat to the Park's wide diversity of native plant life, a threat to the natural change of that plant life, and of particular concern to the unique plant and geological landscape of the Moawhangao region to the east of the Park.

In 1966 a survey showed Heather to be present over an area of 8000 ha, but Pinus contorta was seen to be a greater problem and more feasible to control.

By the 1980's grubbing, handpulling and herbicide sprays were used against the Heather which controlled the individual plants, but made no real impact on the spread of the weed.

In 1984 the spread was estimated to be excess of 22000 ha and 1986 a workshop on Heather control held at Whakapapa in the centre of the Park concluded that the only viable form of control was to adopt a biological attack.

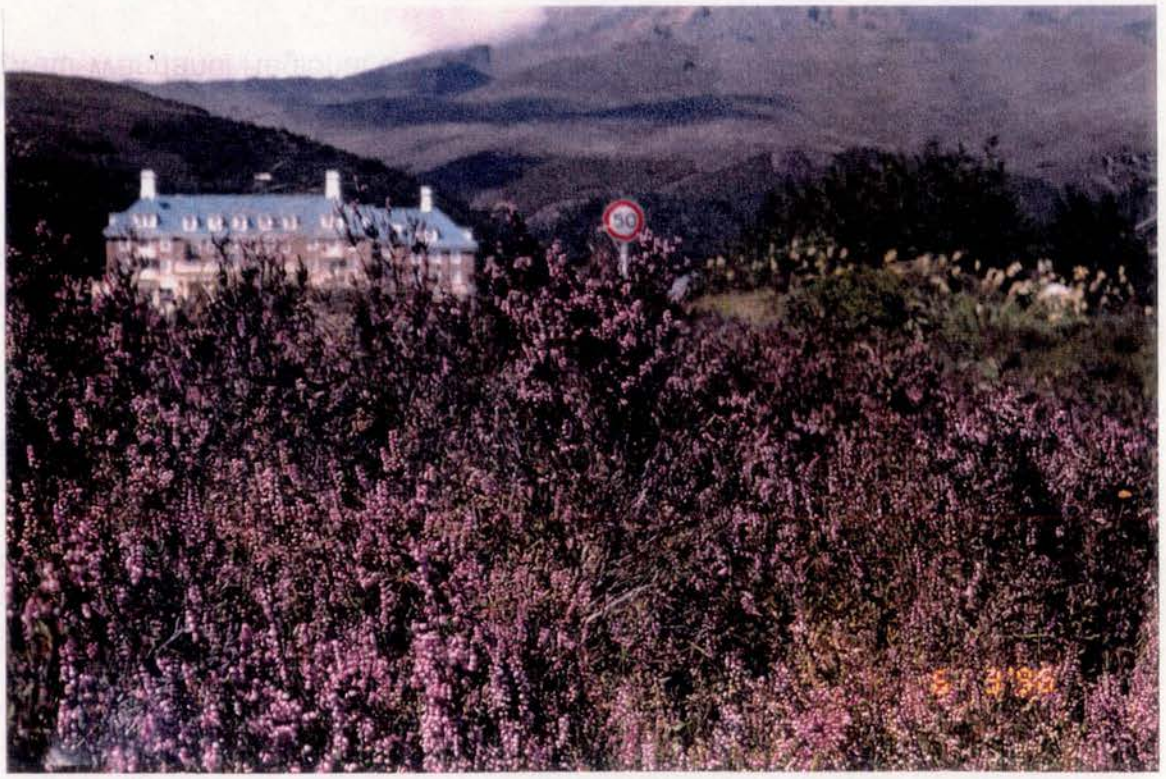
The Department has since carried out widespread studies of a European Heather eating beetle Lochmaea suturales which is known to damage Heather growth in Europe and studies indicated it will do similar damage to the plant in this country.

Following more than 10 years of research, workshops, consultation and publicly reviewed environmental and importation impact assessments, 250 adult beetles were released in January this year.

The intent of the beetle release is that browsing will reduce Heather's competitive advantage and that of new generations of Heather which should allow natural succession of indigenous plant species to suppress the Heather and reduce its rate of spread into adjoining areas, both within the National Park and in neighbouring properties.

Time will tell.

Joe Martin
Manawatu-Wanganui Regional Council



Thistles Explode in Hawke's Bay

During the summer and autumn of 1994/95, parts of Hawkes Bay suffered one of the most severe droughts in history. The effects of this are still being felt, not only in thistle germination, but also in the survival rate of erosion control planting. (Poplars planted during this period in Central Hawkes Bay had a survival rate of between 0 and 25%.)

Nodding thistle has probably been the most prolific growing thistle , closely followed by Variegated thistle. Properties that until this year have been able grub out thistles without to much effort, have found that they have had to turn to chemical control for the first time in many years.

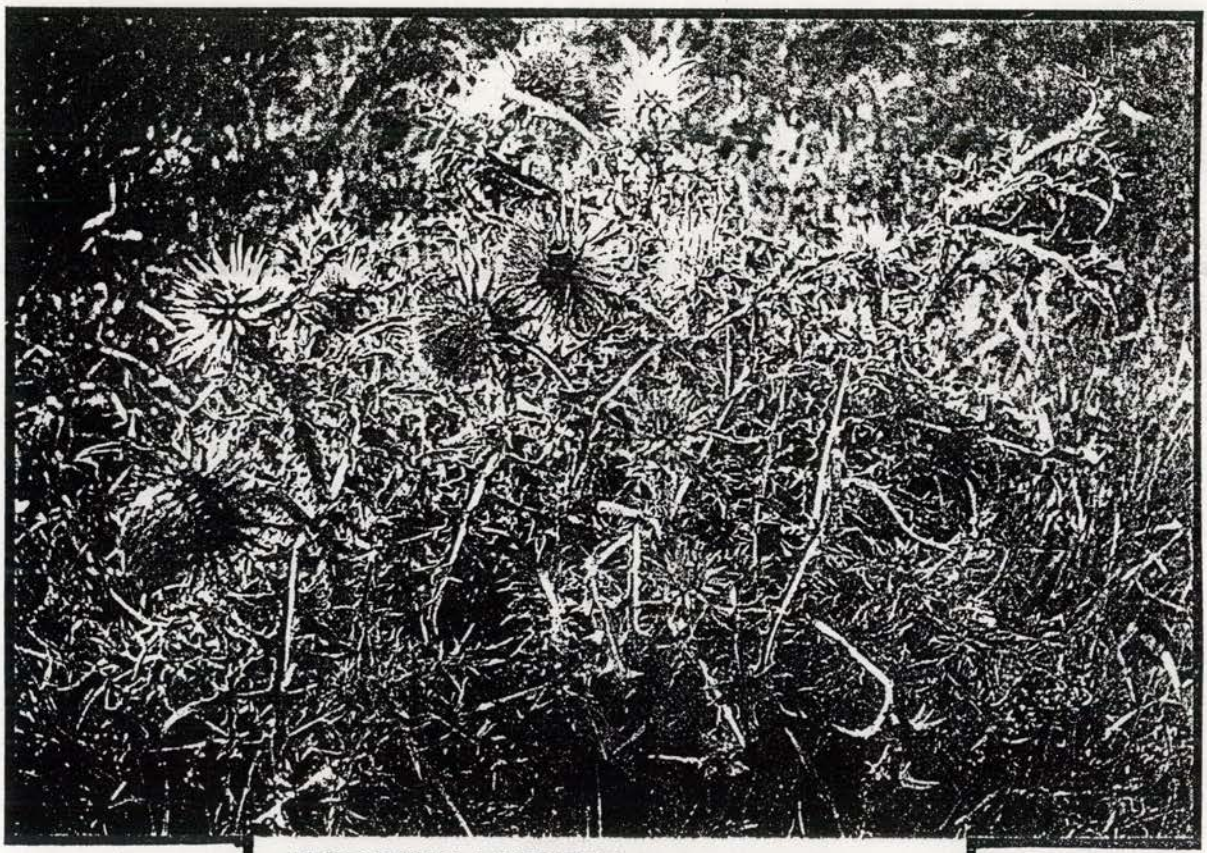
The problems have been compounded by the continued germination of nodding thistle due to a reasonably wet summer. We are also having problems with hormone resistance, and multi crown plants. The increased occurrence of multi crown plants has been put down to the very hard grazing brought on by the drought. One of the main problems we have found, has been the farmers inability to correctly identify these plants, consequently they have been treated as seedling plants, and have in most cases received a sub lethal dose of chemical. The other main problem has been with hormone resistant plants,which can now be found in most parts of Hawkes Bay. Although we have continually publicized this the message does not always get through. This has led to farmers blaming in most cases the chemical, or their local stock firm rep. We intend to do more publicity in April in the hope that more people will read and react. Part of the problem is also in trying to educate farmers into spraying during the Autumn. The problem here is the farmers attitude of, if I cant see it I don't spray it.
Obviously the cost of continually spraying or grubbing thistles when we get more than one germination is in most cases prohibitive. Also the damage to pasture by applying chemicals during spring and summer is extreme. At this time of the year we have had to recommend other methods such as mowing. (Before anyone jumps on the phone to tell me that this can cause multi crown plants, and will only add to the problem. I hasten to add, that this is a last resort action ,that at least clears the existing plants and allows the pasture to come away.)

Of particular interest was the finding of a white flowering nodding thistle. These plants were found on one property only, and covered an area of approximately 0.5 hectares. I would be very interested to know if these have been found in any other area , and to what extent.

Hawkes Bay has a habit of throwing in a drought every now and again, just to liven up the life of HB NPOs, or so it seems.

Robin Packe.

EVERYONE'S RESPONSIBILITY



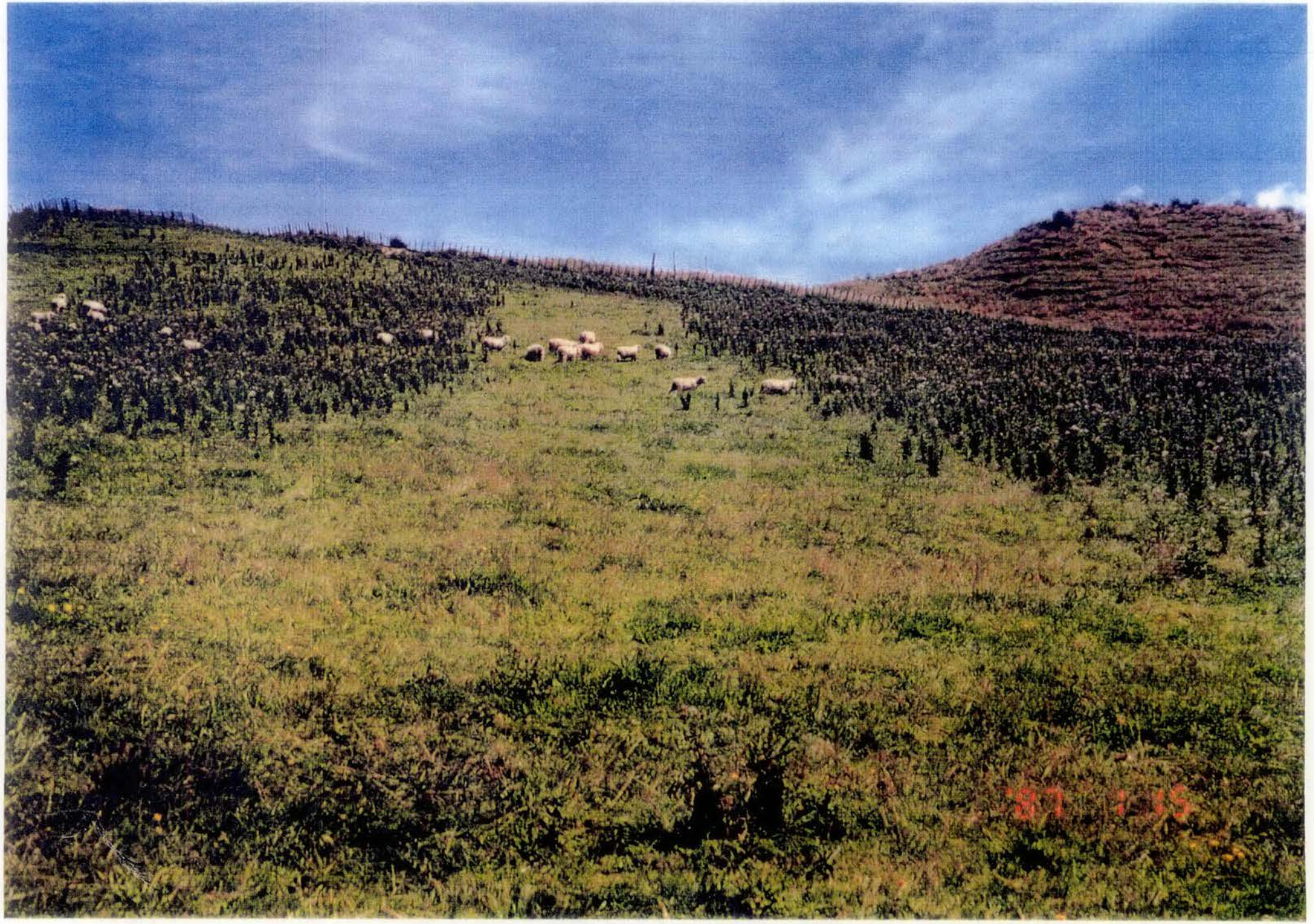
NODDING THISTLE *(Carduus Nutans)*

This Class B target plant has the potential to be extremely damaging to pastoral farming in this Region, with its ability to restrict grazing, smother pasture and achieve total ground cover.

Nodding Thistle will grow in most soil types and once established it is difficult and costly to eradicate owing to the mixed age and size of plants. Nodding Thistle can be introduced via hay, seed lines, stock or machinery. There is a greater risk when these items are bought in from other Regions.

Z WIPER

500 MLs. VERSATIL PER HA



CALIFORNIAN THISTLE TRIAL WORK IN THE WAIMARINO

Calis are the biggest problem weed in respect to loss of pasture use in the Waimarino, and following numerous requests from occupiers I decided to carry out trial work using the wiper method plus collating other control work using both ground and aerial methods.

Work had been done in the past using various brews of MCPA, MCPB, 24D, Versatil, Roundup and Escort with varying success.

The wiper method was chosen because the chemical is applied only to the target plant and as the Cali is a perennial with an extensive root system it requires a good translocating chemical, hence the choice of Versatil.

Work was undertaken during January-February 1995 using both Roto-wiper and Z Wiper, with the aim of applying between 250-500 mls of Versatil per ha at various water rates, using both double and single pass methods.

Results varied from very good, fair to terrible, with my conclusion being, as I was working in heavy infestations , Versatil at 40/1 and applying between 15-20 litres per ha, up to 95% control can be achieved.

Ground boom spraying work using 2 litres 24D, 100 mls Versatil and 150 litres water per ha was also undertaken, and achieved some 65% - 75% control. It appears that once over the 100 mils per ha rate of Versatil, clover damage can be expected.

Two 200 ha blocks were also aerially treated using 3 litres MCPA, 100 mls Versatil and 50 litres water per ha, with the initial work undertaken late December and a follow-up of one block in March.

Results of the single treated block revealed approximately 60% - 70% control with little clover damage, while the second block shows close to 100% control but has severe clover damage.

The occupier involved believes this clover damage is out-weighed by the gain inavailable grazing and intends to oversow the area with clover.

I am fairly sceptical regarding the aerial method of control and recommend caution.

Further trial work using both Escort and Round-up is being undertaken at time of writing.

Joe Martin
Manawatu-Wanganui Regional Council

RESEARCH

Gorse biggest problem on chem-free plot

by Rachel Forde

GORSE is proving the biggest challenge for an experimental chemical-free farm at AgResearch's Ballantrae hill country research station.

Two 25-hectare farmlets at the station were set up as a trial in 1991, one to be farmed conventionally and the other managed with no chemicals, including drenches, insecticides, vaccines, dips or herbicides.

Scientist Alec Mackay, officer-in-charge at Ballantrae, said the aim was to find out how production would be affected if a typical sheep and beef hill-country farm was managed without chemicals.

Interest was growing in reduced-chemical or chemical-free farming, both from consumers demanding "organically-grown" meat and farmers battling growing resistance to insecticides and herbicides.

World markets for low-residue and organic produce, estimated at $20 billion last year, were expanding.

Dr Mackay expected animal health, particularly damage from internal parasites, to be the main constraint on the performance of the chemical-free farmlet. But the growth of shrubby weeds such as gorse were a greater problem.

Each farmlet is stocked with equal numbers of breeding ewes and ewe hogget replacements, and each finishes equal numbers of wether lambs, breeding cows and cattle.

The weight and health — including parasite burden — of each animal is monitored, along with wool production, lambing and calving percentages, stock losses, soil fertility and weed infestation levels.

So far, production from the chemical-free farmlet has been 10-15 percent less than the conventional block, mainly due to heavier parasite infestations limiting the weight gain of young stock.

Animals suffering ill-thrift from heavy parasite burdens have been taken out of the experiment and drenched.

In the first year, 25 percent of the ewe hogget replacements had to be "recovery drenched", but this percentage has since dropped to 3-5 percent.

Grazing management, based on the principle that internal parasites of sheep do not affect cattle, and vice versa, is used on the chemical-free farmlet to minimise parasite infestations.

Ewe lambs are weaned on to paddocks previously grazed by cattle, while calves are weaned on to paddocks previously grazed by ewes.

Enough time is allowed for eggs deposited in one type of animal's faeces to hatch and develop into larvae, which are then consumed and destroyed by the other type of animal, lowering the larvae populations on the pastures before the initial sheep or cattle return.

But weeds have become a big problem on the chemical-free farmlet. Gorse has spread quickly, reducing the available grazing area.

Dr Mackay said a mix of biocontrol, in the form of gorse spider mites and thrips, and chopping was being tried, but so far controlling gorse growth without herbicide was the biggest threat to the chemical-free farm.

Though overall production was lower, this did not mean the chemical-free approach was unviable. "Organic", chemical-free produce attracted premiums of between 5-15 percent.

Chemical-free farming could also gain New Zealand access to markets that would otherwise be unavailable.

Manchurian Wild Rice
(Zizania Latifolia)

Manual control of this plant has proved largely ineffective and early chemical trials required excessive rates to have even a limited affect upon the plant.

Trial work on an infestation of the plant in the Wellington area has been successful using a mixture of Galant - Escort - Amitrole, plus surfactrant. These being applied at no more than label rates by gun and hose unit (application rates are available from myself or Paul Champion, Ruakura).

Trials on the Plant using a range of chemicals individually showed no long term control, but trials of several combinations of chemicals has shown the brew recommended as being totally effective.

It was observed that translocation of chemical has killed plants not initially sprayed.

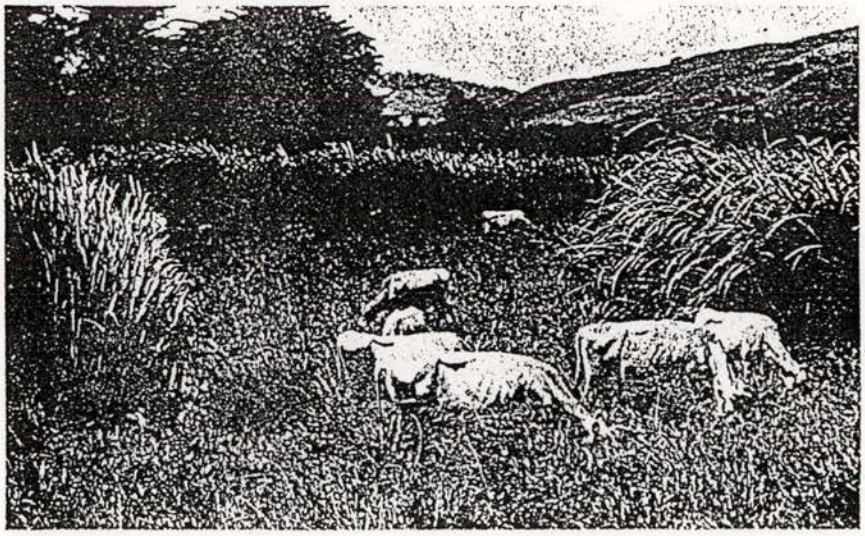
The plants rhizomatus root structure appears to carry the chemical onward.

Recovery of other wetland and pasture plants in the area sprayed showed little or no long term affects with native sedges appearing in the sprayed area within 4 months of application.

To comply with requirements of the Resource Management Act no areas where the plants were in water, were sprayed, but one area of stream bank was controlled and where plants were rhizomatously connected, or appeared so, they suffered chemical affects and died.

Hope this helps those of you who have this plant.

E H GARD
Noxious Plant Officer



MANCHURIAN WILD RICE *(Zizania latifolia)*

Erect perennial, taller than raupo, some plants over 5 m. Leaves – as broad as raupo – may bend over at the top but do not twist, whereas all leaves of raupo twist but do not bend. This grass was introduced to Dargaville from Asia in ballast, and is slowly spreading in watercourses in all directions for a distance now of about 40 km. It spreads from heavy rhizomes but does not grow on dry land. This grass has a pleasing appearance and provides shelter from sun and wind, but blocks waterways and causes good land to become waterlogged. It has been difficult to control.

AUSTRALIAN SEDGE LOCATED IN THE HAWKE'S BAY

This is one target plant that three years ago we believed we had only to destroy the progeny of one small infestation and we would be clear of it.

Since then due to persistent ranging, and publicity, three new infestations have been located, ranging from only a few scattered plants on one site and two fairly major sites covering large areas of steep country in the Raupunga, Wairoa regions. Identification of this weed was a difficult obstacle to overcome because of its similarity to other sedges, but when seed heads appear there is no doubt left as to what plant it is.

What does it look like?

- Australian Sedge is a tussock-forming perennial.
- Its very small flowers are grouped together in catkin-like spikes on the end of triangular, drooping stalks and along the main flowering stem in clusters of twos or threes.
- The leaves are about 5mm wide, and Y shaped in cross section. Their edges are harsh and inclined to cut if fingers are pulled through the leaves. Individual plants are deep rooted and stand up to a metre tall.
- Australian Sedge is different from other sedge species that favour swampy areas, as it prefers land which is seasonally dry.

Control of one site proved to be very difficult due to the steepness of the terrain, and considerable efforts were put in to achieve excellent results spraying with Roundup at the recommended rates.

This even involved carting clean water in on horse back, to the gang ranging the slopes with knapsacks. Before and after photos proved that this gang spot sprayed every plant in the area. At 14 months out from the original spraying, only a few seedlings have germinated on this site. Since then the manager has located more in another part of his farm.

Late in 1995 another site was located in another area, miles away from the other sites, and due to the lateness of finding this site spraying was not completed until this season.

Once again it was in steep difficult country in the Wairoa area. It is a plant that cattle will browse on when young, but as plants become old and strong not even goats will eat it. We are not sure as how this plant arrived in the Wairoa region but suspect that cattle trucked in from Northern Gisborne, where this weed grows, is a possibility.

Both large Stations have been very co-operative, and the Managers are always on the look-out for further sites

Ron Hodgson
NOXIOUS PLANTS OFFICER

Weed control too little too late for Waikato

By ERICA RAWLINGS

REGIONAL council Environment Waikato has to take a tougher enforcement line on weed control, Waikato Federated Farmers says.

During summer near record amounts of ragwort and other weeds have been prevalent throughout the district and Waikato Federated Farmers president Graham Pinnell says a survey of members shows action by EW has been too little, too late.

Mr Pinnell, Cambridge, says no landholder has a right to infest neighbouring properties.

"In the postal survey of our members' opinions, those believing Environment Waikato's approach to enforcement of weed control was too soft outweighed those believing it was too tough by 10 to one."

Mr Pinnell says it is unrealistic to expect badly infested properties to be brought under control immediately, but it is realistic that the boundary is kept clear of seeding weeds.

"The bottom line is that if a farmer is threatened by weeds from a neighbouring property he should be entitled to expect an effective response from Environment Waikato."

Mr Pinnell also says the Crown's contribution to weed and pest control in the region is "paltry".

He says Crown land occupies 24% of the region and it only proposes to contribute 6% to the cost of EW's regional pest management strategy.

"The Crown estate does not only benefit from pest control but many of their bush fringes are notorious for harbouring high concentrations of weed and animal pests."

EW plant pest programme manager Michael Bent says the federation's gripe is not unreasonable and it was an unpleasant year.

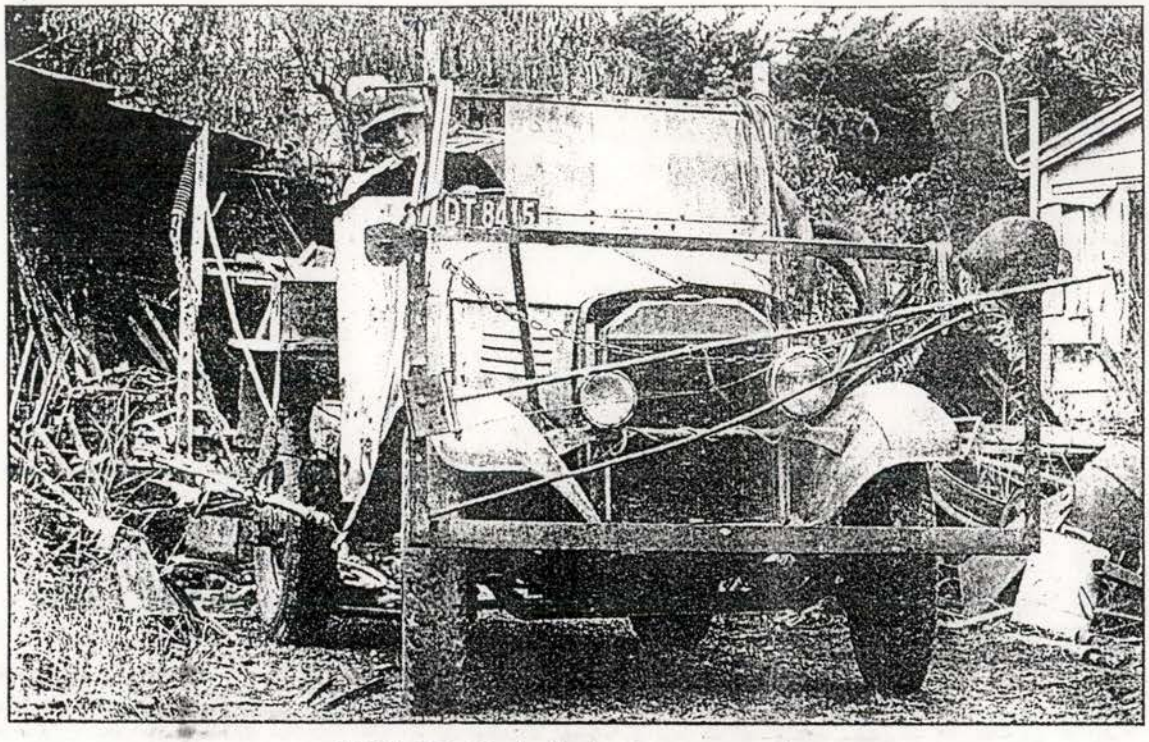
Mr Bent says EW control work was not as good as he would have liked.

"It was a pretty tough year, but we are planning to take a stronger line in enforcing boundary control in the future.

"I feel that we can do better and will do better," Mr Bent says.

Farming NEWS

PEOPLE



EVEN at 78, Clarrie Fowler keeps on trucking.

Clarrie's the oldest sprayer in the south

CHRISTCHURCH. — Clarrie Fowler, at 78, could be the oldest spraying contractor.

Even if there is someone older, it is odds on that Mr Fowler's spraying machine is the oldest in the country.

The machine, which he designed himself, dates from about 1960, 10 years after he started on his own in the spraying business.

He built the machine to cope with the increasing demands of spraying potatoes, grown in huge quantities at the time.

He took a Chevrolet engine, a General Motors gearbox, and the axles from a Bedford truck. The machine is on its third 1939 engine, and Mr Fowler intends to put in a fourth soon — another 1939 Chev.

"Yes, you could say there's only one like it. It hasn't caused me much trouble over the years," he said.

"I've used it for all types of spraying. And for a time, before the fire brigades were established out here, I used to fight fires with it."

He admitted modern vehicles were more suitable for spraying, but added: "If any competition is out there, they don't try very hard."

Mr Fowler owns a bit of land at Hoskins Road, Aylesbury, 28km west of Christchurch, and runs a few sheep on it. He's a widower, and says he has no thoughts of retiring. He doesn't throw anything away, and his house is surrounded by collections from the 45 years he has lived on the property.

"No, I don't throw much away. I'm always picking up something. I usually find it useful for something." He left Halkett School at 14 and, having been born on a Halkett farm, went to work on another. He continued with farm work in the district until 1950, when he went spraying on his own.

NZPA

Insects for biological control of old man's beard

Richard Hill
Manaaki Whenua - Landcare Research, PO Box 69, Lincoln

Wherever I go, I am told that this has been a bumper year for weeds. What is true for thistles and ragwort seems to be equally true for old man's beard. Despite everyone's best efforts, it continues out of control in some areas, and appears at more and more sites. Although we don't claim to have the ultimate answer to the old man's beard problem, perhaps we can draw some comfort from the likely release of biological control agents for the weed over the next few months. Adrian Spiers (HortResearch) has been working with us to develop a disease for release in New Zealand, and discusses progress elsewhere in this issue. Here is a brief summary of development of insects for old man's beard control.

Phytomyza vitalbae, old man's beard leaf-mining fly

We have now applied to MAF Regulatory Authority for permission to release this species into New Zealand. An Importation Impact Assessment was prepared to accompany the request, and this is now being considered by a range of organisations as part of MAF's consultation process. The IIA contains all available information about the known costs and benefits of old man's beard, and presents the results of experiments conducted over 3 years to examine the risk posed to non-target plants by the control agent. Briefly, the results indicate that New Zealand native *Clematis* species are not at significant risk from the fly, but we cannot rule out incidental attack on some *Clematis* species of European origin when grown near old man's beard. It will take a further 2 months to complete assessment of the proposal. If permission is granted, we will release the fly from quarantine in May, but field releases will not begin until next spring.

Since the IIA was submitted, the International Institute of Biological Control in Switzerland has reported on research completed there in 1995. Further experiments were conducted to confirm the strong host-specificity of the fly under field conditions. Once again, these showed that it strongly prefers old man's beard over other *Clematis* species, and that New Zealand native species are not at risk. Laboratory experiments showed that newly-emerged female flies needed to feed on the leaves of old man's beard (or one or two close relatives) before they could lay eggs at all. This exciting result suggests that if old man's beard plants are absent, the fly cannot permanently colonise many other *Clematis* species.

Old man's beard sawfly, *Monophadnus spinolae*

Sawflies are plant-feeding wasps. They are only distantly related to the colonial wasps we know so well in New Zealand, and cannot sting. There are no native species, but a few species have introduced themselves into New Zealand, notably sirex wood wasp and pear slug (or cherry slug).

This group of insects is renowned for being extremely host-plant specific, and the old man's beard sawfly is no exception. Adult females lay eggs between the surfaces of the leaf. These hatch, and the white larvae feed like caterpillars, browsing the leaves. This species is rare in Europe, and until recently, IIBC used larvae collected from the field to complete safety tests. Even these half-grown larvae were unable to feed significantly on any test plants, but nibble some leaves slightly.

IIBC has recently developed a laboratory system for rearing the sawfly. This was a major breakthrough, and using this system, they produced newly-hatched larvae for use in safety-tests. When plants that had been nibbled by half-grown larvae were offered, newly-hatched larvae died without feeding. This confirms that the sawfly is totally host-specific to old man's beard.

We will complete an IIA, and apply for permission to release the sawfly into New Zealand before July. A population of the sawfly will be imported into quarantine in May. Given the clear experimental results, we expect to release the sawfly next spring.

Old man's beard beetle, *Xylocleptes bispinus*

I consider this to be the most important natural enemy of old man's beard active in Europe. Beetles burrow under the bark of stems, forming branching galleries in which the larvae develop. When many beetles attack a stem, these galleries can intersect, ring-barking the stem, and killing the vine above. Even in heavy old man's beard infestations in Europe, vines rarely exceed 20 mm in diameter. I believe this is because most are killed by the beetle.

Unfortunately, safety testing of this species has proven difficult. Although all New Zealand native *Clematis* species are now growing at the IIBC research station in Switzerland, stems are not yet large enough for the plants to be used. Testing has been carried out in the laboratory on cut stems of various plant species field-collected in New Zealand and sent to Europe. The results of such unnatural tests have not been encouraging. The beetle has developed successfully on several species. It has also been found naturally infesting other European *Clematis* species. Clearly it prefers old man's beard, but we will need more research to define its true host range experimentally.

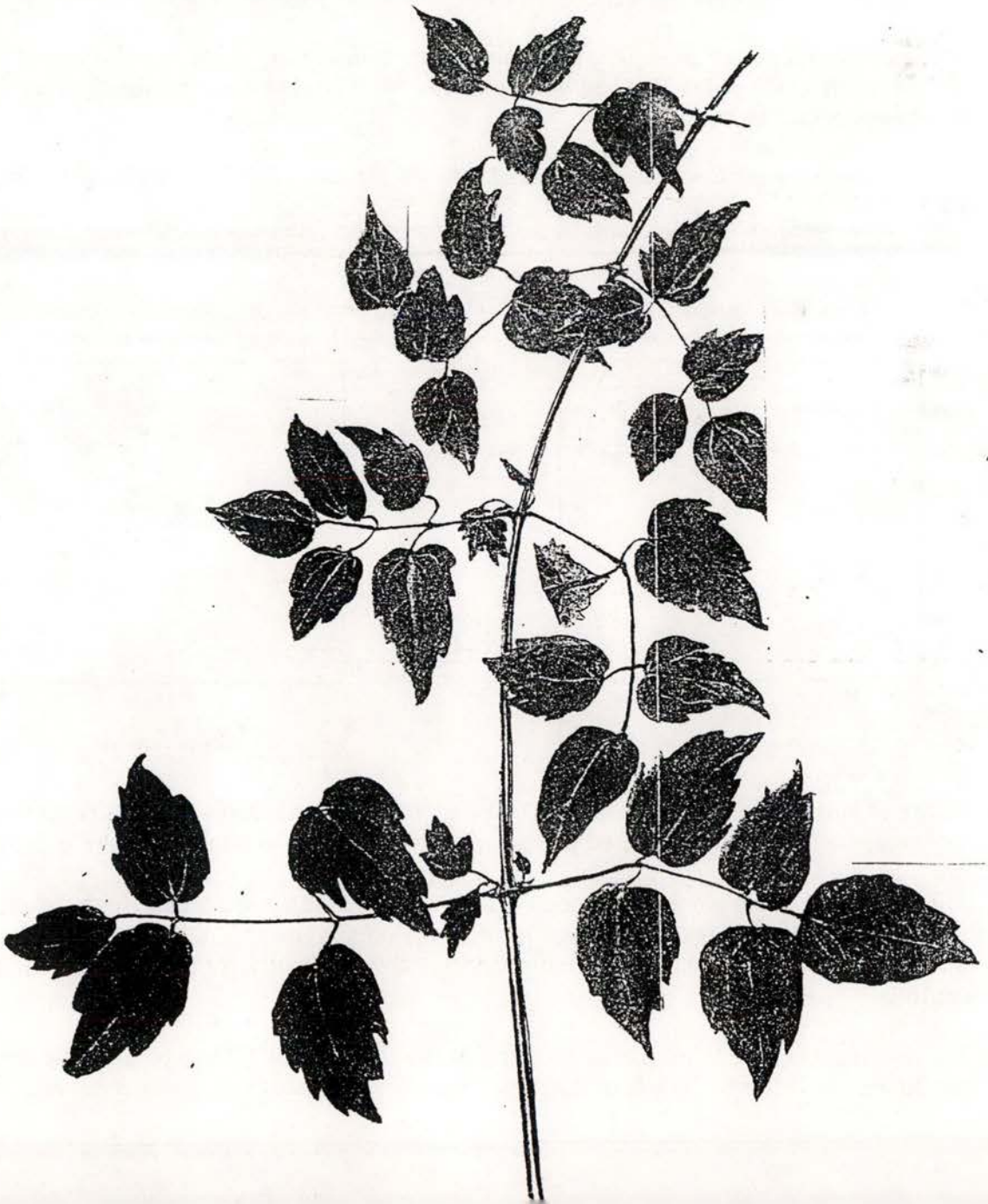
Future plans

IIBC will complete research into these three species over the next 12 months, and may test the host-range of a defoliating caterpillar, *Thyris fenestrella*. We hope to release the leaf-mining fly and the sawfly next spring, and Adrian Spiers will release *Phoma*

clematidina. These plans are subject to release approvals being granted by MAF. We hope to supply populations of the leaf-mining fly to a number of clients this year, but releases of the sawfly will be limited to one or two research sites. We hope to begin baseline measurements of old man's beard plants and populations at several release sites, in preparation for measuring the impact of the agents.

The biological control programme for old man's beard has reached an exciting stage. Hopefully we will be able to put at least three agents into the field within nine months. It remains to be seen how this effort will translate into sustainable control of the problem.

This research is currently funded by the Foundation for Research, Science and Technology, and a consortium of Regional, District and City Councils. Without their support, development of biological control of old man's beard would not be possible.



Impact of Gorse Spider Mites on Gorse: A summary of experimental results from Southern North Island hill country

Manaaki Whenua
Landcare Research
NEW ZEALAND LTD

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- This summary describes the results of an experiment aimed at measuring the effect of two consecutive years' infestation with gorse spider mites (*Tetranychus lintearius*) on gorse.
- In late 1992, we selected 15 matched pairs of gorse bushes (five in each of three paddocks) and infested one bush of each pair with gorse spider mites. Plants were re-infested with mites in December 1993. One pair of plants was lost when a land slump killed the control plant. The remaining 14 pairs of bushes were cut and weighed in early December 1994.
- By the end of the two-year experiment, gorse spider mites had damaged an average of 51% of the canopy of the plants that had been infested. No control plants were damaged and no mites were found on control plants.
- By the end of the experiment, the control and infested plants were still of similar sizes (Fig. 1, a & b).

Fig. 1(a). Effect of gorse spider mite infestation on size of gorse plants

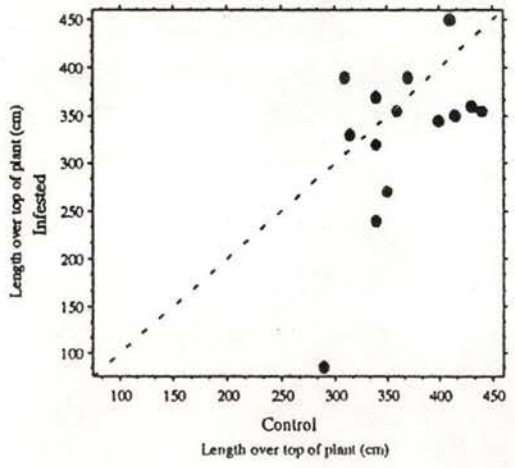
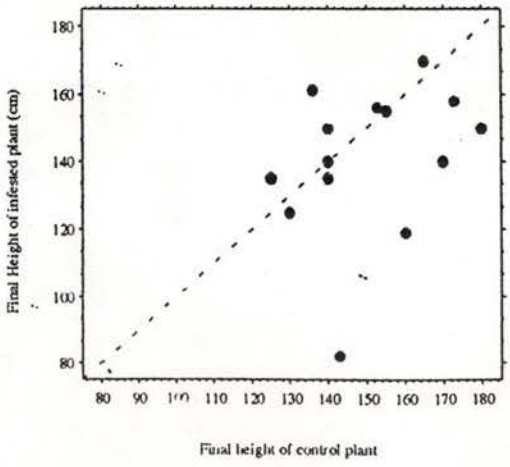


Fig. 1(b). Effect of gorse spider mite infestation on height of gorse plants



- Of the 14 surviving pairs of gorse plants, 12 had infested plants that were lighter than their control plants. On average, infested plants were 18% lighter than control plants (Fig. 2, a&b).
- Mites affected gorse plants to different extents in the the three paddocks. In the paddock where mites had the greatest impact, the infested plants averaged 75% of the weight of the uninfested bushes. In the least affected paddock, infested plants were 10% lighter than their controls.
- The real impact of the mites is greater than these figures suggest. This is because the figures are differences in the *final weight* of the plants, but since the plants were already several years

old at the start of the experiment, the mites had a very much larger impact on *growth* during the two years.

- Gorse spider mites are just one of several new biological control agents that should work together to reduce the vigour of gorse. Biological control agents can be important even if their individual effects are too subtle to measure. Thus, when none of the other agents are present, an agent may have no measurable impact on gorse but nevertheless play an important role by using up the plant's ability to compensate for further damage.

- This sort of reduction in the internal density of gorse bushes may ultimately reduce the plant's longevity by making it more susceptible to damage by wind, fungal pathogens, and stock browsing or trampling.

Fig. 2(a) Control plants weigh more than plants infested with gorse spider mites

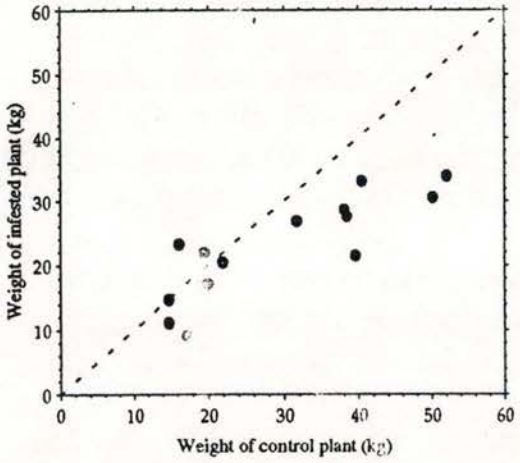
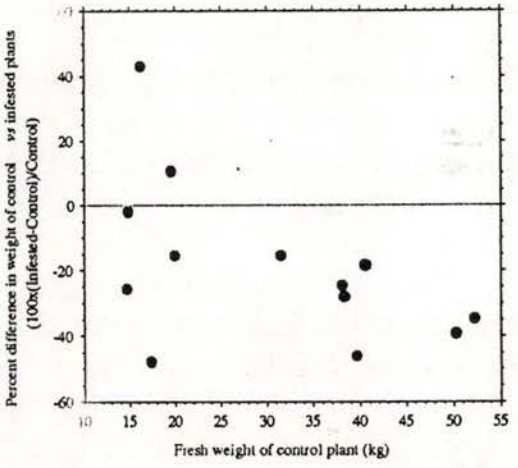


Fig. 2(b) Gorse spider mites affected large plants more than smaller plants



OF GORSE YOU CAN DO IT

In 1995 a property owner complained to one of our officers regarding gorse on their boundary, comprising a lovely 40 ha paddock of yellow flowering gorse. A complaint form was duly filled out, and because the area in question is mine , it was then up to me to carry this out to a satisfactory conclusion. Did I hear you say , no problem ???

The owner (of the gorse) was spoken to and agreed to clear the area of gorse, when he had sold an area to obtain sufficient money to finance the project. As this fitted in with the season that was okay. End of problem,? OH NO !!!!!!

Enter neighbour number 2. Thou shalt not apply or cause to be applied any chemical within 200 m.of my Pine trees, (5-7 yrs old) or I will sue not only you (property owner) but also the helicopter pilot. The pilot now requires medical attention for a severe case of diarear and tries to do a disappearing act, with me in hot pursuit.
After much discussion it was agreed that spraying would not take place near this boundary, and that all reasonable precautions would be taken. End of problem, OH NO!!!!!!

Re enter neighbour number 1, (original complainant who has since planted trees adjacent to the gorse.). Thou shalt not apply chemical by helicopter within 200 m. of my trees or I will sue everyone involved. They will spray the area of concern themselves with neighbours agreement..

We now have a situation whereby neighbour number 1 wants to sue most people, neighbour number 2 wants to sue anything that moves, and the Regional council could be forced to take court action if nothing is done.

I (as noxious plants officer involved) make a monumental (or should that be hysterical) decision The decision is for the helicopter to take up a monsoon bucket and drop it (or preferably its contents) on the centre of the problem area,. This will result in an area of gorse approximately 4m. in size being sprayed and an area of approximately 20 hectares being left, but all parties are now hysterically happy.

End of problem? I certainly hope so.

Robin Packe Hawkes Bay.

File 6/7/1 *14 March 1996*

Chilean Needle Grass - Ongoing Trail Progress Waipawa

We have two trial areas near Waipawa where "Wana" Cocksfoot has been sown in an attempt to smother out Chilean Needle Grass. This work is being undertaken with contract assistance from Mike Slay, Ag Research.

The two trial sites were sprayed with glyphosate October 1994 and left fallow over summer. They were again sprayed prior to sowing in late March 1995.

One site was lightly rotary hoed, being the cultivated site before being roller drilled. The other , a non cultivatable site, was direct drilled in two directions.

At the time of drilling ground conditions were good and rainfall that night assisted in a good germination of cocksfoot.

The areas have been monitored: The Direct Drilled Site in January 1996 monitoring indicated at the directed drilled site that although the cocksfoot had become rank earlier on ie. had now been grazed by cattle. Some tramping of pasture had caused material to rot and pasture damage was visible. The base of the pasture was thick, which is good for inhibiting Chilean Needle Grass. Sheep grazing is now being undertaken to graze the top off the pasture.

Occassional Chilean Needle Grass seed heads were visible throughout the site and were maturing unevenly. In comparison seed heads in a uncontrolled paddock had matured evenly and profusely.

Dalapon was applied on a small area within the trial. There was a reduction in the seedling numbers but a few still remained, (possibly resistant). All rates of Dalapon reduced the cocksfoot vigour and left a more open sward.

Cultivated and Drilled Site: there was a good establishment of cocksfoot but with the cultivation it appears Chilean Needle Grass seed in the ground may have been spread by this method as seed heads were found distributed throughout the pasture.

Conclusion: there has been an excellent establishment of cocksfoot and Chilean Needle Grass has been suppressed.

Comments:

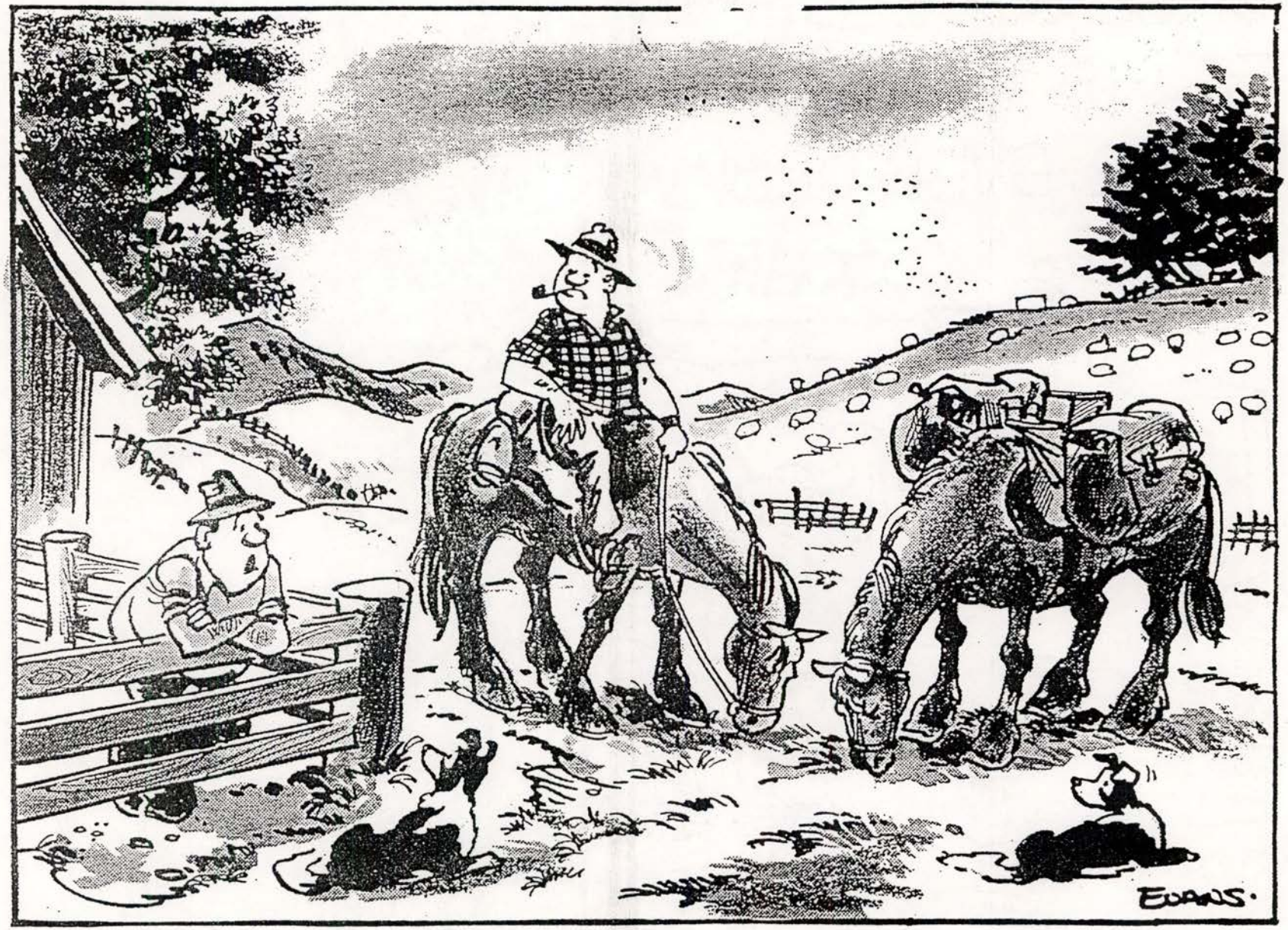
It is less than twelve months since the drilling of cocksfoot. More time is required to obtain a final result as more work ie. timing of grazing, fertilizer application, are to be applied to increase the vigour of cocksfoot and outcompete the Chilean Needle Grass.

Some farmers may have experienced difficulty in correctly grazing cocksfoot to avoid damage to the plant. We are dealing with small uneconomic blocks that have the problem of not having sufficient stock to graze at the correct time and are having to borrow stock to do the grazing.

As with any trials, questions and answers can be made at the end. We hope we will have answers, but in the meantime - oh! for a biological control agent.

Two property owners are intending to plant Pinus radiata as a pulp regime on the steep country. The purpose is with a dense canopy of trees this will suppress Chilean Needle Grass growth.

Stuart Bennie
Noxious Plants Officer
Hawkes Bay Regional Council



"I'm thinking of diversifying into weeds, blackberry and scrub."


OH YEH, SHE'S A GREAT BLACKBERRY BUSH BUT, BY CRIPES, IF THE NOXIOUS WEED INSPECTOR EVER DROPS IN
COOCHIE...