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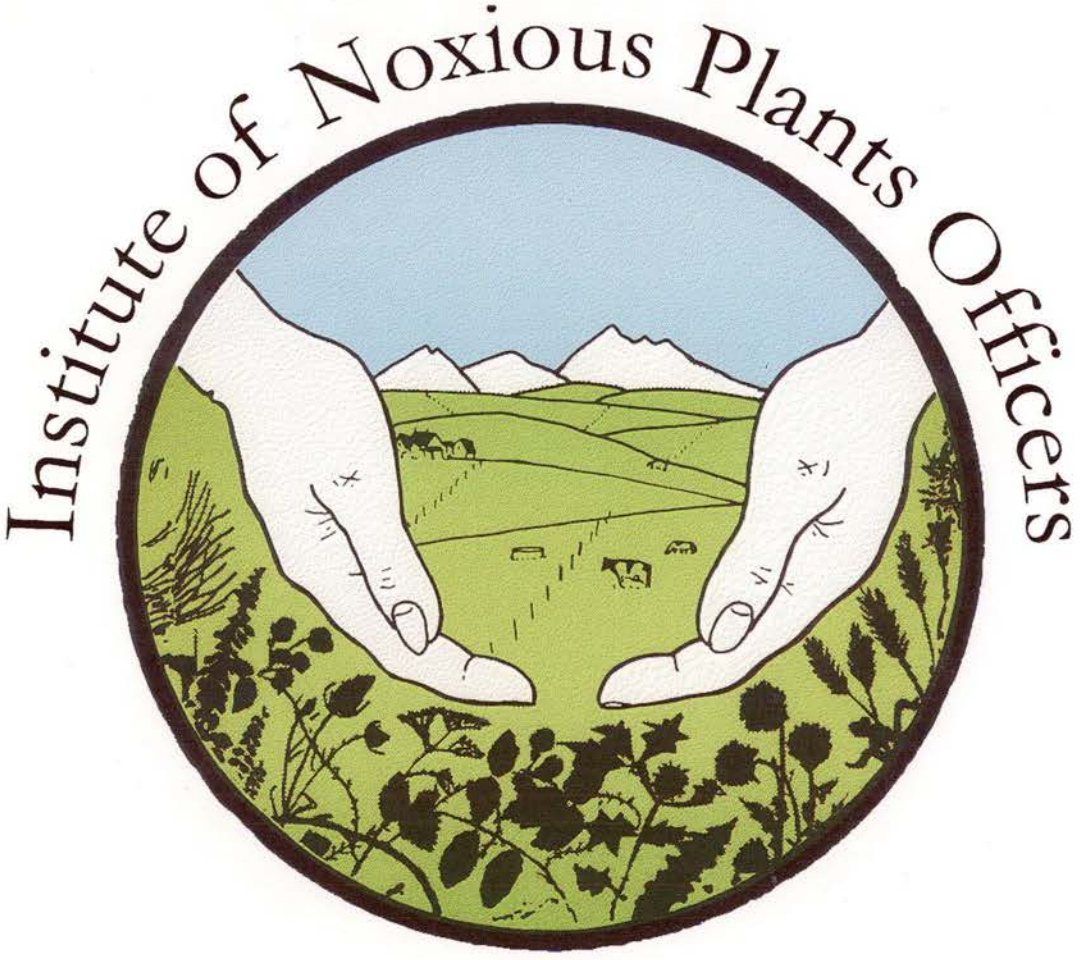

Autumn Issue - 1997

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INDEX

Editorial

The winds of change have been sweeping through the corridors of the Canterbury Regional Council. In fact one could say in more ways than one, what with restructuring in late 1996 and our non-descript summer season it has been a year to remember, and in some cases, a year to forget!!!

The remaining staff involved in the plant pest field have many challenges ahead. New areas of responsibility, new unfamiliar terra-firma to cover and some new plants to deal with. The people who have left also have new goals ahead of them too, but their efforts during their stay as Noxious Plants Officers have left their mark for all to see. Their contribution to our region will be remembered and the remaining Officers under the Biosecurity hat will carry on upholding the new strategy of the region.

For those of you who are less familiar with our region, the following information may be of interest:

The land area of Canterbury is 4,264,000 ha, of which 60,000 ha is lakes
154,000 ha is rivers
17,000 ha is urban

The land use capability classifications are:- (from best to worst)

Class I	23, 000 ha
Class II	267,000 ha
Class III	541,000 ha
Class IV	514,000 ha
Class V	20,000 ha
Class VI	1,109,000 ha
Class VII	631,000 ha
Class VIII	928,000 ha

Usual residential population of the Canterbury Region is 468,040

1996 census night population of the Canterbury area was 478,912

Between 1991 and 1996 there were significant changes within territorial authorities:
an increase in the population of 16.0% in the Waimakariri District and
16.2% in the Selwyn District in that 5 year period.

1996 census night figures: An annual increase in the Waimakariri District of 15.7%
An annual increase in the Selwyn District of 17.7%
An annual increase in the Banks Peninsula District of 14.8%

The colour photo depicts our typical area topography (from mountains to the sea). Photograph courtesy Canterbury Regional Council.

In conclusion, just a note about our earth's temperature. The recent release of statistics about the world's average temperature - overall it was 0.23 degrees warmer than the average for the years from 1961 to 1990. Over 1000 climate stations world-wide collect information and although 1996 was colder than 1995, it was still one of the ten warmest years since 1860 when records began.

As hosts of the 1997 training seminar, we look forward to seeing as many of you and your partners at Lincoln 18-21 August this year. Planning for this is well in hand, with the theme "change" to the fore.

This could be the last **Protect** under the name of the Institute of Noxious Plants Officers Inc - in with the new, out with the old! Let's look towards the future with obtainable goals to take us well into the next century.

JOHN THACKER
BIOSECURITY OFFICER
CANTERBURY REGIONAL COUNCIL

N.B. Thanks to all who contributed to this issue of *Protect* and once again the valuable support of our sponsor **Monsanto (NZ) Ltd**.

WAIMAKARIRI RIVER ADJACENT TO SHEFFIELD

Aerial Photo Courtesy Canterbury Regional Council
- Mike Provost Photography

A Potted History Of Where We Have Come From ...

The Winds Of Change

As Biosecurity Officers operating under the provisions of the Biosecurity Act 1993 and amendments what do you know of the philosophies, legislation, and terminology's which have governed your predecessors.

The saga of legally troublesome weeds began 143 years ago at the time of the Provincial Councils in early New Zealand history.

The founding enactment was the "Thistle Act 1954" - an Act to prevent the propagation of certain plants known as "thistles", passed by the Wellington Provincial Council.

In those days the legislation was not so much in the form of Acts, but more usually as Ordinances, as in the Thistle Prevention Ordinance 1862, passed by the Otago Provincial Council.

The titles of these two measures showed two features. Some related to a group of botanically related weeds as in the thistles (see above), or to a single weed as in the Furze (gorse) Ordinance 1868. This was an Ordinance to provide for the eradication of furze growing on public roads of the Taranaki District Council.

In Provincial Council days all enactments, with one exception, dealt with terrestrial plants. The exception, dealing with an aquatic plant, was the Watercress Ordinance 1864, passed by the Canterbury Provincial Council.

The term 'noxious', which has been extant in legislation in New Zealand in the short title of enactments for nearly 50 years, first appeared in the Thistle Amendment Act 1857 of the Wellington Provincial Council and referred to thistles as "noxious thistles". It replaced the more descriptive term "obnoxious thistles' of the Thistle Amendment Act 1856, also passed by the Wellington Provincial Council.

The term 'noxious weeds' was first used in Section 292 of the Central Government's Counties Act 1886, in the context that Counties " . . . may contribute funds for the eradication of noxious weeds".

It is of interest to note that from the demise of the Provincial Councils in 1875 (Abolition of Provinces Act 1875) to the passage of the Noxious Weeds Act 1900 under the Central Government, there was no specific legislation relating to noxious weeds, despite several abortive attempts to pass such measures.

The precursor position of Biosecurity Officer was the "Inspector of Thistles" current in pre- 1875 Provincial Council enactments, Acts and Ordinances. Over the years, under different pieces of legislation, there have been several different designations - Noxious Weeds Officer, Noxious Weeds Inspector, Noxious Pants Officer and Nassella Tussock Inspector.

The Noxious Weeds Act 1900 was an Act to prevent the spread of Noxious Weeds and to enforce the trimming of hedges, and laid the patterns for the short title of such legislation for nearly 80 years.

Over the period 1900 - 1979 there were a number of principal Acts which consolidated the earlier legislation and its amendments, introducing new ideas on control, eradication and administration.

In chronological order the enactments were:-

Noxious Weeds Act 1900
Noxious Weeds Act 1908
Noxious Weeds Amendment Act 1910
Noxious Weeds Amendment Act 1921
Noxious Weeds Amendment Act 1923
Noxious Weeds Amendment Act 1927
Noxious Weeds Act 1928 - An Act to consolidate certain enactments of the General Assembly relating to Noxious Weeds and the trimming of hedges.
Noxious Weeds Amendment Act 1934
Noxious Weeds Act 1950 - An Act to consolidate and amend certain enactments of the General Assembly relating to weeds and the trimming of hedges.

There was an exception to the pattern of legislation, an Act specific to a single weed, somewhat reminiscent of Provincial Council measures. This Act had a different philosophy behind it, also a different style of administration. It was the Nassella Tussock Act 1946 - an Act to make provision for the control and eradication of the plant known as Nassella tussock, and for the constitution of the North Canterbury and Marlborough Nassella Tussock Boards.

The optional elements etc. in the provisions of the Noxious Weeds Act 1950 had proved unsatisfactory and, after wide consultation by the "Fitzharris Committee" (Committee on Noxious Weeds Administration 1972-3) with the agricultural and pastoral industries, a new measure was prepared. The short title dropped the traditional word "weeds", new principles were adopted, and the title gave an outline of the philosophy.

The new enactment was the Noxious Plants Act 1973 - an Act to make better provision for the control of noxious plants, to co-ordinate actions aimed towards such control, and to foster a spirit of co-operation and assistance among persons adversely affected by the spread or growth of noxious plants in achieving such control.

Two important features were that the Crown was bound by the Act, and the Nassella Tussock Act 1946 was revoked, and the operative administration sections of that Act became Part II of the new Act.

The current legislation, Biosecurity Act 1993, has introduced new philosophies, administrative elements, and it's own terminology. The terms of earlier years have been replaced by new ones, and for the first time in virtually 140 years members of the plant and animal kingdoms are treated in the same enactment.

You are beginning a new phase or period in the control and eradication of undesirable plants

A.J. Healy
Christchurch
March 1997

Onopordum - The Tale Of The Taurian Thistle

Mr. J. Thacker, Biosecurity Officer, Canterbury

In late 1986 Garry Kerr, Noxious Plants Officer for the Mackenzie District Council, was doing some roadside inspections accompanied by Mr. Gordon Girvan, Chairman of the Mackenzie D.N.P.A. They drove past a patch of what they initially thought were nodding thistles. After giving the site some thought and a second visit with another N.P.O., Gary Foster, it became obvious that these plants were something more than just nodders. A specimen was sent to Mr Arthur Healy who, after some research and deliberation, classified it as Taurian thistle (*Onopordum tauricum*). The discovery of this site at Albury, South Canterbury, is the only known site in New Zealand and has since been briefly described in the Flora of New Zealand Volume IV.

Taurian thistle originated from the eastern Mediterranean, a native of Bulgaria, Romania, Greece, Crete, and the Crimea where it occurs in grassland, open scrub and fallow fields. Outside of the Mediterranean this species has been found as an introduced plant in Southern France, Italy, the United States of America (a small infestation reported in 1968 from Davis, California), and Australia, where a small infestation was found near Goroke, Victoria, in 1913.

This thistle belongs to the same family as Cotton thistle - the heraldic thistle used to decorate the haggis. Both species have been cultivated overseas as bold and unusual garden ornamentals, and it is possible that the find at Albury was either in an old garden site or was an escape from such a location. Cotton thistle is found in some eastern South Island localities and has been offered for sale in plant shops as an ornamental and for culinary use. Hybrids between the two species have been found in Turkey.

O. tauricumis is a biennial, with a rosette of basal leaves in the first season. It produces stems, flowers, sets seed and dies in the second season. It is a vigorous grower, green and glandular, tall growing to two metres, strongly spiny on leaf margins, wings on stems, and large globose heads with purplish flowers. Reproduction of the plant is by fruit ('seed') only. Examination of the fruits and detachable pappus shows the pappus hairs to be toothed only - not feathery. This suggests that relatively few fruits would be dispersed for long distances by wind. Therefore the bulk of the fruits would be deposited in the vacinity of the parent plants. Long distance dispersal could be by carriage on fleeces, in mud on hooves and animal coats, by water in waterways, and surface water after heavy rain. Vehicles and implements could disperse the fruits also.

Now the matters of aggressiveness and weed potential. Australian experience indicates that this thistle has not been aggressive. J.H. Willis (Flora of Victoria 1972) states " . . . has been known from a very small infestation near Goroke since 1913, but has not spread beyond about half an acre during the past 50 years". This behaviour is in marked contrast to that of the three white cottony species of *Onopordum* (*O. acanthium* - cotton thistle; *O. acaulon* - stemless onopordum; *O. illyricum* - Illyrian thistle) which are widely established and troublesome in several Australian states.

While Taurian thistle may appear to be less aggressive than some others already in New Zealand it was recommended by Arthur Healy and others that the infestation at Albany should be eradicated. It was therefore given 'target' status under the Mackenzie D.N.P.A. programme and an eradication programme was put in place.

Acknowledgement

The author would like to thank Mr. Arthur Healy for some of the information used in this article.

Spread of gorse and broom seed by animals

Nick Ledgard * and David Rossiter **

Summary

Animals, particularly sheep, are probably major carriers of gorse and broom seed in New Zealand. It is likely that they have been responsible in the past for gorse and broom invasion of significant areas of clean country. The process may well be continuing today virtually unchecked. Case studies are described and simple strategies proposed to minimise the risk of spread by animals. Land managers and administrators need to be alerted to spread risks involving animals, in particular to grazing sheep in gorse / broom areas during times of seed pod explosion and then moving them to clean country before they are shorn. Birds are often accused of spreading seed, but there is no New Zealand documentation to support this. Research is required to define more precisely the role that birds and animals (such as sheep, cattle, goats, deer and pigs) play in spreading gorse and broom.

Background

Gorse (*Ulex europaeus*) and broom (*Cytisus scoparius*) are two of New Zealand's most common introduced woody scrub species. The areas affected by these two species appear to be increasing, particularly in lightly grazed hill and high country. Traditional woody 'weed' control measures of burning, applying grazing pressure and oversowing and topdressing are seen to be increasingly unsustainable for environmental and economic reasons (Kerr, 1992). In addition, there are declining numbers of livestock (particularly sheep) and wild animals, such as deer, goats and rabbits, some of which have played a role in woody species control in the past. As a result the invasion of woody species is likely to continue. This process has been predicted for some time by keen observers of changes in land use and natural vegetation successions. For example Kevin O'Connor, as Professor of Range Management at Lincoln College, wrote in 1981: "The success of woody revegetation cultures forces land users to choose between forests and improved pastures". Making that choice will be one of the "principle landscape planning issues for the tussock grasslands and mountainlands for the next 20 years".

For successful control or management of weed species, a good knowledge of seed dispersal mechanisms is important when trying to devise strategies to interrupt spread. Despite the importance of gorse and broom in pastoral land management and the dozens of research and popular articles written on the two species (Gaynor and MacCarter, 1981), there is a surprising lack of written information on seed dispersal. Aspects such as plant successions involving gorse and broom (e.g., Williams, 1983; Lee *et al*, 1986) and particularly control (e.g., Balneaves and McCord, 1990; McCracken, 1993) have received most attention. Even in articles addressing more general ecological issues (e.g., Zabkiewicz, 1976: Williams, 1981) seed dispersal is poorly addressed.

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Seed dispersal

Gorse and broom seed is disseminated directly from the plant by means of explosive pods which scatter seeds a few meters at most (Hill *et al*, 1996). The seeds have no wings, so wind assistance is only likely to be minor, although some seeds remain attached to pods which could aid wind dispersal over short distances (P. Williams, Landcare Research, Nelson, pers comm). Thereafter, further spread is most commonly aided by gravity, water, machinery and animals.

* **Gravity**. Its role can often be witnessed in hill country where an inverted triangular 'smear' of plants extends mainly down slope from the circle surrounding the original parent plant.
* **Water**. There are many examples (e.g., in braided riverbeds) of spread by water where seed has been carried down stream and into riparian areas reached by floods.
* **Machinery**. The role of machinery is also well known, with many examples throughout the country of spread from scattered outlier bushes alongside areas where machinery has worked or travelled. Seed can be readily transported in gravel used in track construction and in mud lodged on heavy machinery such as bulldozers which are frequently used to create farm fence lines and tracks. Vehicles, particularly trucks carrying riverbed gravel, are capable of carrying seed considerable distances from gorse and broom infected areas. Intensive machine work (such as in forest planting preparation or harvesting) in areas of only scattered gorse and broom occurence, can widely distribute any seed in the soil and lead to significantly increased infestations (P. Williams, pers comm).
* **Animals**. Transport of seed in animal coats, or in mud on feet of the likes of sheep and cattle is more insidious and less well known. For this reason, it could well be continuing virtually unchecked. Birds are frequently accused of spreading seed but there is no New Zealand documentation that this occurs. Indeed, apart from pheasants, quail and possibly chukor, all of which have limited distributions, birds are unlikely vectors. If they were major players in gorse and broom seed spread there would be many more 'outlier' occurrences than there actually are. Also, there would be significantly more bushes appearing in bird congregating areas such as roosting sites - as there is for other bird-spread woody species such as elderberry, rowan and blackberry. Deer and possums are unlikely to carry much seed in their coats but could consume seed and carry them short distances. Pigs could be more serious vectors, picking up seed on their coats while mud wallowing, and consuming seed with dirt ingested while rooting the ground for worms and roots (P. Williams, pers comm).

The remainder of this article elaborates further on spread by browsing animals, particularly sheep, on strategies for minimising such spread and on potential avenues for basic research.

Why suspect animals as a major spread agent?

Once the eye is alerted to it, the circumstantial evidence for animals being a major agent in gorse and broom spread can be frequently observed, particularly in the spring when the yellow flowers of both species allow easy detection. Many examples can be seen in the authors' home area of North Canterbury.

Example 1 - Broom gully, near Hanmer

Broom Gully is a tributary of the Waiau, and is readily viewed across the Waiau gorge from SH 7 just before the turn-off to Hanmer Springs. Broom is the dominant cover from the river bed (at under 300 m altitude) up to the surrounding hilltops approaching 800 m. How did broom manage to spread over so large an area? Fringe spread of a few meters annually from exploding pods most likely explains localised increases in density, but not distant spread. Neither is gravity, water or machinery likely to have been a major contributor to such a complete cover over a wide area. Birds can be discounted for the reasons given above (if birds did play a major role, why is there so little broom on the other side of the river where landuse is very similar?). This leaves ground-based animals, and the most common and obvious candidates are sheep. It is not difficult to imagine the role they played in spreading seed from the first bushes, probably introduced by water (down the Waiau river), and by machinery (alongside farm tracks and bull-dozed fence lines). During the heat of summer days when the 'click' of exploding broom pods is almost constantly heard, the woolly coats of sheep resting in the shade under these bushes must have been well loaded with seed by the time they headed out for their evening feed. It is likely that some seed remained in the coats for weeks or even months until accidentally loosened or the sheep were shorn. Where that seed fell would depend on where the sheep moved during that time, and to a lesser degree, on the surrounding vegetation which could help dislodge the seed from their coats. Observations in the upper Clarence River indicate that broom spread from the riverbeds was initially to sheep camps, indicating that seed was most readily dislodged where the animals lay down (P. Williams, pers comm). From ridge-top camps, gravity would hasten the spread down slope.

Seed could also have been ingested by sheep, although mature seeds in dry pods are unlikely to be attractive fodder. This may not be the case, however, with goats (also present in the area), who are known to enjoy more 'roughage' and be wider ranging in their diets. Goats are often used to 'control' gorse and broom, but *if they do consume seed* and hence aid dissemination, they could be doing more harm than good, especially in areas where occurrence of the two species is only scattered. Pigs may also ingest seed while rooting the ground for food. Seedlings would only result if seed remained viable after passing through a browsing animal's digestive system. The authors know of no studies concerning the palatability of gorse or broom seed or their viability once eaten by animals or birds. Seed could be carried in an animals gut for some distance. Research on horses in Australia found peak recovery of seed transmitted through a horse's gut occurred on the fourth day after ingestion (St John Sweeting and Hill, 1991)

Example 2 - Snowdale, Lees Valley, North Canterbury

Gibson Brothers of Lees Valley took up the Snowdale Run in the early 1960s and soon recognised the problem of sheep carrying gorse seed from the heavily infested Whistler river up onto clean country. One of their first tasks was to fence off the riverbed to keep sheep out during pod ripening. They contend that this effectively stopped the long distance distribution of seed from the riverbed to the rest of their property.

Grazing under forests

Foresters often graze sheep and cattle under trees to supplement income, reduce fire risk and control weed species, such as gorse and broom (Hansen, 1988). For reasons covered previously, using them for weed control may have unforseen ill-effects in the form of assisting seed dissemination, which could be significant if the incidence of gorse and broom is light and the animals are wide ranging. Some years ago one of the authors saw sheep being used for weed and fire control purposes in a young Southland forest. Gorse seed had come in with the shingle used for road surfacing and bushes were scattered along the roadside, 1-2 m tall and seeding. Sheep were resting in the shade beneath them as the pods opened. It is quite likely that the large gorse-free areas away from the roadside now have a scattered population of young gorse bushes.

Past studies

No doubt there are many farmers and land managers who are aware of cases of gorse and broom spread, where the most likely vectors of seed have been grazing animals. However, despite good circumstantial evidence that animals are major contributors to gorse and broom spread, there is little appreciation of the fact and remarkably few published observations. Stevens and Hughes (1973) studied broom on Molesworth Station and found flowing water to be the primary dispersal agent, with seed carried in mud on vehicles being responsible for spread along roads. They also felt that "mud sticking to animals leaving drinking water sources" could be a factor in "upstream and uphill spread". Stevens and Hughes also noted that "There is no evidence that seeds are attractive to birds, although it is possible that they are."

Strategies to minimise spread by stock

Farming

If grazing stock are major agents in carrying gorse and broom seed there are some simple strategies which could be employed by land managers to minimise the risk of spread.

Sheep. Land managers should be discouraged from grazing sheep in gorse and broom areas during the time of pod opening (mid December to the end of January). *If this cannot be avoided they should not be moved to clean country until after they have been shorn.* Similarly, farmers purchasing stock, particularly in summer and autumn, should be aware of where they have been grazing and if it was on gorse or broom country during seed dispersal times, make sure they are shorn before being placed on clean land. The risk of seed being carried in mud on feet is considerably smaller, but those wishing to minimise the risk of spread by this means should only move animals during dry weather when there is little chance of mud clinging to feet.

Cattle. Cattle coats are too short to readily hold seed. Mud on their feet is more likely to carry seed so movement to clean areas should only be during dry weather. If there is concern about seed having been eaten during browsing of gorse and broom bushes, a short rest to allow 'emptying out' before put out on clean country is all that is necessary.

Goats and deer. Seed is unlikely to be carried in the coats of short-haired animals such as goats and deer and the risk from mud clinging to feet is small. However, *if they, do consume seed* they should be emptied out before moving to clean country. In areas where goats are being used for gorse and broom control they may be restricting growth and even killing some bushes, but if present during the seeding period and eating mature or semi-mature pods they could be actually contributing to a future problem. If this is the case then their use as a gorse and broom control agent needs careful consideration.

Forestry

Foresters should be aware of how wild and farmed grazing animals could spread gorse and broom seed. *Sheep should not be grazed in the forest during times of seed dispersal*, particularly if the incidence of gorse and broom is light and the animals are free to roam large areas. Before being brought into the forest, the recent grazing history of any animals should be checked and *if seeding gorse or broom has been involved, sheep should not be allowed in until they have been shorn and all animals should have no mud on their feet.*

Research

It appears that there is considerable room for more research into how animals are involved in gorse and broom seed dispersal. It is surprising that the topic has remained unexplored for so long. Suggestions are:

* More detailed field investigations of case studies to find common trends.
* Examinations of coats of sheep that have been in seeding gorse and broom to determine how much seed is carried and for how long.
* Studies on seed and pod palatability to grazing animals, the time it takes for seed to pass through digestive systems (sheep, cattle, goats, deer, pigs and possums), and seed viability after such passage.
* Studies of palatability to birds, particularly pheasants, quail and chukor and the viability of seed which may be in droppings.

Conclusion

Research is needed to determine the roles animals play in gorse and broom seed dispersal. If the risks outlined above are real, land management and administration agencies should alert all land users, particularly farmers - although there are no statutory requirements to do so. The options available for minimising these risks should be well advertised, particularly that of grazing sheep in gorse/broom areas at times of seed pod explosion and then moving them to uninfected areas before they are shorn.

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Trounce Gorsekiller® Launched

Trounce® Gorsekiller promises to add spice to the brushweed control market.

With the launch of Trounce Gorsekiller over the last few weeks, a new broad spectrum, one pack brushweed herbicide is now on the market. Trounce Gorsekiller is an easy to use, low toxicity, non residual herbicide that is incredibly broadspectrum.

All this, plus Trounce Gorsekiller can be sprayed onto gorse and broom during any season of the year. Autumn, winter, spring and summer applications of Trounce Gorsekiller will give effective brownout and long term control of gorse and broom.

Four years after putting Trounce® into the brushweed and forestry markets, Monsanto has launched an all in one formulation. With the development of this all-in-one dry brushweed formulation, the opportunity now exists for forestry companies and farmers to use only an environmentally sound, dry formulation to control brushweeds.

The new Trounce Gorsekiller formulation offers control of a wide range of brush species. Trounce Gorsekiller is recommended for the control of 25 brushweeds using handgun application, and 8 using aerial application. However the reality is, that this is the broadest spectrum brushweed herbicide on the market, offering cost effective control of a vast range of species as diverse as bracken, gorse and pampas!

The following table summarises current handgun label recommendations for Trounce Gorsekiller.

Trounce Gorsekiller gm/100 litre water	**Brush Species Controlled**		**Comments**
350 gm	Gorse	Hawthorne	Application to gorse, broom & manuka can be made at any time of the year. For other species, rule of thumb is treat in summer & autumn.
	Broom	Bracken	
	Buddleja	Manuka	
	Wattle	Woolly nightshade	
	Tutu	Himalayan honeysuckle	
	Blechnum	Montpellier Broom	
	Fennel	Tree lucerne	
	Hebe	Radiata pine	
	Elderberry		
500 gm	Pampas	Toetoe	
350 gm + 3 gm 60% ai metsulfuron	Blackberry	Barberry	Treat through summer and autumn.
	Boxthorn	Old mans beard	
	Matagouri	Sweet brier	

Most of the labelled species are controlled at 350 gm Trounce Gorsekiller/100 litre. With gorse, broom and manuka, control can be achieved from year round applications. Pampas and the native toetoe require the higher rate of 500 gm/100 litre.

Some species such as blackberry, barberry, sweet brier and old man's beard, require the addition of 3.0 gm 60% metsulfuron per 100 litre spray mix.

In all situations full wetting of the plant being treated is essential to achieve full control.

Aerial recommendations cover gorse, broom, blackberry, matagouri, buddleia and sweet brier. The rate range for aerial gorse is 10-14 kg Trounce Gorsekiller per ha. NO other product is required to be added. Simply pre-dissolve the granules and add to the mixing tank. Trounce Gorsekiller fits well into gorse and general scrub development situations. Treated species are well controlled, they desiccate rapidly, allowing removal by fire, followed by oversowing and fertiliser, to quickly convert scrub covered land to productive pasture.

The best way to prevent reversion of pasture to brushweeds, is to raise the fertility of the soil and maintain a competitive pasture sward. A competitive sward will be a long time in the making if clover is decimated every few years. By controlling brush species with Trounce Gorsekiller, leaving NO soil residues, then by oversowing and fertilising, the creation of a competitive sward can become a reality.

All of the so called "pasture selective" brushweed herbicides damage pasture species. Legumes such as lotus and clover are the first to go, leading to a decline in pasture fertility, resulting in loss of high value grasses and their replacement with low productivity species such as browntop and Yorkshire fog. Some of the pasture selective brush herbicides go further and control favourable grass species such as ryegrasses. All of these "pasture selective" brush herbicides leave soil residues.

Trounce Gorsekiller also causes pasture damage, it does not hide behind the false mask of being "pasture selective". We openly state that the product kills grasses. However Trounce Gorsekiller does not control legumes, and it is the only brushweed herbicide that leaves NO soil residual activity.

Pasture improvement with oversowing of improved clovers and high value pasture grasses, can be carried out within days of applying Trounce Gorsekiller. Low value pastures with low producing species can be easily developed into high producing swards without fear of chemical residues preventing grass or clover establishment.

Trounce Gorsekiller is an outstanding new brushweed herbicide. It is broadspectrum, has low toxicity, is non residual. It is a one pack, cost competitive tool for converting brushweeds to productive pasture.

TROUNCE®

By Monsanto

GORSEKILLER

FOR THE CONTROL OF GORSE, BROOM AND OTHER BRUSHWEEDS

ACTIVE INGREDIENT – contains 635g/kg glyphosate as the mono-ammonium salt in the form of a water soluble granule.

Note: Use of this product in any manner not consistent with this label may result in injury to persons, animals or crops, or other unintended consequences.

Registered pursuant to the Pesticides Act 1979 No. 4404.

BEWARE:

Apply this product carefully. Spraydrift will cause severe damage to desirable plants.

It is an offence under the Pesticides Regulations to use this product in a manner that results in damage outside the treated property.

GENERAL INFORMATION

- Trounce Gorsekiller will control a range of brushweeds in agriculture, waste areas and as a pre-plant treatment in forestry.
- There is no need to add Pulse® Penetrant when applying Trounce Gorsekiller.
- Following treatment the visible effects will take 3-6 weeks to appear depending on growing conditions.
- Avoid contact with foliage or green stems of desirable plants as severe damage will occur. Avoid application in winds which allow drift onto desirable plants.
- Treating plants that are stressed by drought, frost, grazing or previous herbicide application or are covered with dust or dirt will result in reduced weed control.
- A rainfree period of 30 minutes following application is recommended.
- Always mix and apply Trounce Gorsekiller with clean water.
- Mixed solutions should be used within 24 hours.

OVERSOWING FOLLOWING TREATMENT

- Oversowing may take place as soon as desired after treatment, except where metsulfuron has been added as recommended for the control of barberry, boxthorn, blackberry, bracken, matagouri, old man's beard or sweet brier.

MIXING INSTRUCTIONS

- Premix Trounce Gorsekiller with water into a slurry prior to adding to a half full spray tank. Fill tank.

PRECAUTIONS

Store in original container, tightly sealed away from food-stuffs and children. Avoid contact with eyes and avoid breathing spray mist. When spraying, wear suitable boots and cotton overalls. Wash exposed skin before meals and after work. Wash clothing after use.

CONTAINER DISPOSAL

Ensure bag is completely empty. Burn if circumstances (especially wind direction) permit, otherwise bury in landfill. Avoid contamination of any water supply with the chemical or empty container.

FIRST AID

If swallowed, do NOT induce vomiting. Give a glass of water. If skin contact occurs, remove contaminated clothing and wash skin thoroughly. If contact with the eyes occurs, hold the eyes open and flood with water for at least 15 minutes. See a doctor.

Emergency Phonelink

For 24 hour specialist emergency advice

Call Freephone

0800 734 607

LIMIT OF WARRANTY AND LIABILITY

Read Limit of Warranty and Liability before buying and using. If terms are unacceptable, return at once unopened. Monsanto (NZ) Limited ("Monsanto") warrants that this material conforms to the chemical description on this label and will perform as described on this label provided that it is used, stored, transported and handled strictly as directed on this label. To the extent permitted by law, (a) all other conditions or warranties of any kind with respect to this material are expressly excluded from any contract of sale of this material; (b) the buyer and/or user assumes all risks of any use, storage, transportation or handling of this material which is not as directed on this label, as well as the results obtained from any such use, storage, transportation or handling; (c) all liability for any direct, indirect or consequential loss or damage including but not limited to such loss or damage caused by negligence is hereby expressly excluded from every contract of sale. If this material is used, stored, transported and handled strictly as directed on this label and fails to comply with any applicable guarantee or warranty, the buyer and/or user may require Monsanto to replace the material involved with an equal quantity of material which does conform to the chemical description on this label. Not for repackaging or reformulation. No licence under any non-New Zealand patent is granted or implied by purchase of this container.

Monsanto

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HANDGUN APPLICATIONS

For the control of a wide range of brush and woody weeds apply Trounce Gorsekiller at 350g per 100 litre spray mix. When treating blackberry, barberry, boxthorn, sweet brier, matagouri and old man's beard add 3g 60% ai metsulfuron for every 100 litre spray mix. When treating pampas and toetoe apply Trounce Gorsekiller at 500g per 100 litres.

Apply to thoroughly wet the entire plant including stems, ensuring complete coverage and penetration. Treat bushes from all sides. Nozzle sizes of No. 6 or greater and pressures of 1500 - 2000 kPa are recommended. Unsprayed portions will regrow and will therefore require retreatment.

WEED	COMMENTS
Barberry	Apply from late flowering until prior to leaf yellowing (Dec-April). Add 3g 60% ai metsulfuron per 100 litre spray mix.
Blackberry	Apply from flowering to leaf yellowing (Dec-April). If plants are defoliated due to grazing, drought or bronze beetle, reduced results will occur. Add 3g 60% ai metsulfuron per 100 litre spray mix.
Blechnum	Apply from November to June.
Boxthorn	Apply from late flowering until prior to leaf yellowing (Dec-April). Add 3g 60% ai metsulfuron per 100 litre spray mix.
Broom	Apply at any time of the year.
Buddleja	Apply from November through to June.
Bracken	Apply from frond unfurling to frosting (Jan-June).
Elderberry	Apply from flowering until prior to leaf yellowing (Dec-April).
Fennel	Apply from flowering until prior to leaf yellowing.
Gorse	Apply at any time of the year.
Hawthorne	Apply from late flowering until prior to leaf yellowing (Dec-April). If plants are defoliated with pear slug, reduced results may occur.
Hebe	Apply from November to June.
Himalayan honeysuckle	Apply from flowering until early winter (Nov-June).
Manuka	Apply at any time of the year
Matagouri	Apply when the plant has full leaf. Add 3g 60% ai metsulfuron per 100 litre spray mix.
Montpellier broom	Apply at any time of the year.
Old Man's Beard	Apply from flowering until leaf yellowing (Dec-April). Add 3g 60% ai metsulfuron per 100 litre spray mix.
Radiata pine	Apply at any time of the year.
Sweet brier	Apply from flowering until leaf yellowing (Dec-April). Add 3g 60% ai metsulfuron per 100 litre spray mix.
Tree lucerne	Apply from December through to May.
Tutu	Apply from flowering until early winter (Nov-June).
Wattle	Apply from November to June.
Woolly nightshade	Apply from November to June. A followup treatment may be required to control seedlings.
Pampas & Toetoe	Apply 500g Trounce Gorsekiller per 100 litre spray mix, at any time of the year.

AERIAL APPLICATIONS

For use in non-crop areas only. Avoid drift onto desirable plants. Apply using half overlap flying technique and water rates of 100 – 300 litres/ha. Use a nozzle configuration that ensures canopy penetration and full coverage of bushes while minimising off site movement of spray. In hilly terrain adjust flight pattern (slope adjust) to ensure recommended rates of application are maintained.

WEED	COMMENTS
Broom	Apply 5kg Trounce Gorsekiller per hectare from October to May.
Bracken	Apply 5kg Trounce Gorsekiller per hectare from frond unfurling to frosting. If bracken is growing in association with blackberry then it is recommended to apply 5kg Trounce Gorsekiller plus 50gm 60% ai metsulfuron per hectare.
Blackberry	Apply 5kg Trounce Gorsekiller plus 50gm 60% ai metsulfuron per hectare from flowering through to prior to leaf yellowing (Dec-April).
Buddleja	Apply 5kg Trounce Gorsekiller per hectare from flowering through to late May.
Gorse	Apply 10-14kg Trounce Gorsekiller per hectare at any time of the year. Use 10-12kg when burning or roller crushing is to follow treatment. Use 14kg when no follow-up treatment is planned.
Gorse-seedlings	Apply 2.5-5kg Trounce Gorsekiller per hectare. Use the higher rate to control seedlings over 15cm tall.
Matagouri	Apply 2.5kg Trounce Gorsekiller per hectare plus 50gm 60% ai metsulfuron per hectare when the plants are in full flower.
Sweet brier	Apply 4kg Trounce Gorsekiller plus 50gm 60% ai metsulfuron per hectare from flowering through to prior to leaf yellowing. Plants that are not fully covered at time of treatment may regrow and require further treatment.

TROUNCE
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SEXUAL CONFUSION IN THE GORSE: AN UPDATE ON THE GORSE POD MOTH PROJECT

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Serendipity is an interesting word. The dictionary defines it as "the faculty for making happy discovered by accident". For scientists, serendipity is when an apparently unimportant or unrelated set of events leads to a leap in our understanding of a problem. Something like that happened recently in our research programme to develop biological control of gorse - more of that later.

If we are to develop a comprehensive strategy for biological control of gorse we must look beyond the existing crop of weeds that is causing such heartache, and seek ways to reduce the spread and abundance of future populations. An important part of this aim is to slowly exhaust the huge bank of gorse seed that exists in the soil, and that means stopping as much seed as possible getting into that seed bank. Gorse seed weevil was introduced for this purpose in 1931. Female weevils chew a hole through the pod, turn around, and lay eggs down the hole. Larvae hatch and eat the seeds inside the pod. They complete development there, and when the pod opens in summer, weevils are thrown out, not seeds. The weevil is now abundant almost wherever gorse occurs (with some notable exceptions, such as the West Coast of the South Island). Just 12 years after it was released, scientists commonly found over 85% of pods examined in the spring contained weevils, and this led some to think that successful control of seed production was at hand. They misjudged the importance of the second period of seed-production in autumn when seed weevil is not active. This can be bigger than the spring crop in areas with warm summers such as Canterbury and the north of the North Island. More recent studies suggest that seed weevil destroys only 30-60% of the total seed crop each year. That is not enough to exhaust the seed bank over time, and so we looked for other agents that might help control seed-production.

The additional species we chose was the gorse pod moth. This moth lays eggs on pods twice each year, once coinciding with spring flowering, and again with autumn flowering. Caterpillars hatch, bore into the pod and eat the seeds. Having destroyed one pod, caterpillars emerge and find another, often destroying three pods before completing development. Research into the host range of this insect was conducted between 1988 and 1990. We

concluded that it was safe to introduce to the New Zealand environment, and asked permission to do so in 1990. Moths were collected in Cornwall, UK, and in Portugal and shipped to New Zealand. A mixed population was quarantined in New Zealand, and the species was finally released for the first time in 1993. Since then it has been released at 70 sites, and is known to have established at six. It is too early to know whether moths have established at most sites, and lots have not yet been checked. We expect moths to establish at most sites, but even then, while populations are building, it is often difficult to find moths. The very first release site was the colourfully names Jimmy's Knob, in Canterbury. There the moths have become abundant, and we have begun to measure the impact they are having on the annual seed crop of gorse at the site. In the first year of measurement, seed weevil and pod moth together destroyed over 95% of the major seed crop in spring, but pod moths destroyed only 10-20% of the autumn crop. Why was this figure so low? We had expected pod moths to be abundant in autumn, and to lay eggs on most of the relatively few pods available at that time of year. Was it because moths were not around at the critical time when pods were formed? To answer this question we needed to find out when the moths were actually present in the gorse, but we had no way of measuring that.

Remember serendipity? This is where it comes in. One of the best ways to monitor moth numbers is by pheromone-trapping, using the sex attractant (pheromone) of female moths to attract male moths to a sticky trap. Pheromones are made up of several chemicals, and it is the precise mix of those chemicals that makes the pheromone unique. This means that females only attract males of moths of their own species. No-one had every isolated and identified the pheromone for pod moth so that approach did not seem to be a viable option, but we talked it over with Dr Max Suckling of HortReseach, who is expert in the field. He suggested that if we were lucky, it might be possible to adjust the chemical mix of the pheromone of the closely related codling moth to make it attractive to pod moth. He obtained four different mixes from colleagues in Sweden for us to try at Jimmy's Knob.

Hugh Gourlay loaded the different pheromone mixes into traps and set off to deploy them at the site. As soon as he opened the door of the car, moths began to gather around, and so it was clear that something was attracting them. The sticky traps showed that moths were attracted by two of the mixes, but not the other two. Development of an effective pheromone

for an insect species often takes years, but with the help of Max and his Swedish colleagues we have leapfrogged this long and expensive process.

What does this mean for us? We can now monitor when gorse pods moths are present in the field, and see whether this coincides with pod production. This will give us insights into how effective the pod moth is likely to be in reducing seed production, and hence how valuable it will be to the overall biological control programme.

What does it mean for you? Standing at the edge of a gorse patch and waiting for a moth to fly by is not an efficient method of monitoring establishment of pod moth, but it is the only one available to you at present. By next spring we may be able to provide you with traps and a method to detect small populations of moths, helping you to determine the status of your sites. Richard Harris will also use traps to confirm field establishment in the experiments he is conducting to determine the optimum size of releases.

We continue to measure the effects of gorse pod moth and gorse weed weevil at Jimmy's Knob, and within two years we hope to be able to tell you how much of the annual seed crop is destroyed, and estimate what this means for the long-term control of gorse in New Zealand.

This research is funded by the Foundation for Research, Science and Technology.

Plant Nomenclature

Roy Edwards, Dept. of Plant Science , Lincoln University

Introduction

There are essentially three ways in which plant names are used. Two of these involve conventions which need to be followed and understood. The third way is the use of the common name or the vernacular. There are no conventions in use for the common name.

a) Common Name (vernacular)

There are no sets of rules for the use of common names. In some instances plants are not well enough known by the general public to have any kind of common name. In other cases the common name of a plant is the same as it generic name eg. *Rhododendron* spp. are commonly known as rhododendrons, on the other hand *Narcissus* spp. are commonly called daffodils.

The common name may be useful, but frequently confusing, eg. the common French marigold is a native of Mexico. Other areas of confusion can arise from the use of the same name for a range of different plants eg. the name cedar is applied in different ways to a range of conifers eg. the New Zealand mountain cedar or pahautea is *Libocedrus bidwillii,* the Japanese cedar is *Cryptomeria japonica,* the Alaskan cedar is *Chamaecyparis nootkatensis* and so on. None of these so called cedar trees are botanically related. Those with probably the best claim to being called cedars belong to the genus *Cedrus* - eg. the Atlantic cedar, Himalayan cedar, the Atlas mountain cedar and so on. In other instances the pineapple is neither a pine nor an apple, while the banksia rose similarly cannot be described as banksia, although in this case it is correctly described as a rose. Sometimes different names (often in different localities or regions) are given for the same plant eg. twitch and couch are both common names for the plant *Elytrigia repens*.

The main difficulty with common names is the lack of precision that can arise from their use. From a practitioners point of view however, a knowledge of the common name can make it easier to discuss plants with lay people in some instances. Botanists, horticulturists and other people who work with plants communicate with each other by the scientific and cultivar names given to plants - not normally through common names.

Where common names are used in text they are usually written in small letters and may follow (usual in scientific texts or reports) or go before the scientific name. Where part of a common name is an adjective or a proper noun the use of upper case may be expected, eg. *Lychnis chalcedonica* (Maltese cross), *Acer palmatum* (Japanese maple). The common name is frequently enclosed in parenthesis where both names are used.

Key Points

Common names have popular appeal and may be useful locally.
They may be misleading.

There are no rules associated with common names.

b) Botanical names

Botanical names are based upon the Linnaean Binomial System. Prior to Linnaeus botanists used to distinguish plants based on a brief plant description written in Latin (Polynomials). With the publication of Species Plantarum in 1753 Linnaeus changed the way plants were named. The basis of this system adopted in 1865 by the International Botanical Congress in Paris was that each plant (species) was given two names - generic epithet (similar to a surname eg. Smith) and a specific epithet (similar to a first name eg. John). This became the foundation for a precise and stable system of naming plants to be established. In 1905 The International Code of Botanical Nomenclature (ICBN) was formalised by a botanical congress in Vienna.

With the acceptance of the binomial by botanists world wide a set of rules or conventions have been developed. Botanists from around the world meet every six years to ensure the system functions as it should and agree on changes if they prove necessary.

The ICBN is based on six principles as follows;

1. The codes of plant and animal nomenclature are independent of each other,
2. Plant names are based on TYPE specimens. (Type specimens refer to the specimens held in herbia - see below),
3. Law of priority on the basis of publication, this states that the oldest of conflicting Latin names is the correct name. **Exceptions**. 1. Taxa above Family level and 2. Nomen Conservandum - where a case has been made to preserve a long standing well known name - usually at generic level,
4. Plants within any particular level of classification (taxon) can only have one correct name. (The correct species epithet is a combination of the generic name with the earliest available validly published name of the same rank),
5. Scientific names are treated as Latin regardless of their derivation. (The gender and endings of words must be consistent eg. *Rosa canina, Cytisus scoparius, Spartium junceum* etc. When an epithet is the name of a person and ends in a consonant, except where the name ends in *er*, eg. *Bauhinia hookeri,* the letters *ii*, are added eg.*Buddleia davidii*. When the epithet is the name of a person and ends in a vowel only one *I* is added eg. *Pachycereus pringlei*),
6. Makes the rules of the code retrospective.

Type specimens

These are the specimens designated as the type or morphological example for that taxon. A type specimen may be one of the following:

Holotype is the original herbarium specimen used by the author to describe a species. It is also the **Nomenclatural type** which is permanently associated with the name applied. A duplicate specimen of a holotype is called an **isotype. Syntypes** are specimens seen by the original author and regarded as the same taxon described.

(Relates to earlier collections when type specimens were not designated as they are today).

Lectotype is chosen from the same material that the author used to write a description of the species (eg. if the original holotype is destroyed, or selected by someone else if the original author failed to designate a holotype).

Neotype is selected by another person (in the absence of any holotype and the original author) as typifying the species, but it is from new plant material.

Conventions associated with Botanical Names

As well as the ICBN being based on the principles as stated above there are conventions associated with writing plant names that must be followed.

1. **Binomial** - Every species of plant has a binomial, this consists of TWO parts, the Generic epithet and the specific epithet. The generic epithet (genus) is always written with an initial capital letter (upper case) and the specific epithet (species) with an initial small letter (lower case). Both names are always either underlined or italicised in the printed text, eg. *Scleranthus biflorus* or Scleranthus biflorus (Nb. infraspecific categories (see 4 below) such as variety or subspecies are written as for a species but preceded with the appropriate abbreviation eg. *Brachyglottis repanda* var. *rangiora* or Brachyglottis repanda var. rangiora.

   The specific epithet is frequently descriptive eg. sinesis indicating Chinese origin. In some cases specific epithets may be misleading eg. *Magnolia quinquepeta* quinquepeta referring to five petals which is not correct for that species.

2. **Abbreviations of categories.**

species	=	sp. (singular), spp. (plural)
subspecies	=	subsp. or spp.
variety (varietas)	=	var.
form (forma)	=	f.
synonym	=	syn.

   The above abbreviations are always written in small letters as indicated and are NEVER underlined or set in italic type.

3. **Abbreviation of generic names**

   Provided the context is unambiguous, generic names may be abbreviated where several species belonging to the same genus are quoted. The generic name is written in full in the first instance and from then on the list can be abbreviated to the initial capital letter followed by a full stop eg. *Acer campestre,* A. *palmatum,* A. *rubrum* etc.

4. **Variety or subspecies**

Both of the above are described as infraspecific categories or categories within a species level. Subspecies is usually used by botanists in contemporary schemes where minor morphological differences appear over a widespread geographical range. The term variety is usually used where minor differences occur, but are not associated with a wide geographical difference. In some botanical works subspecies and variety appear to be interchangeable.
Form (Forma) This is a category that relates only to minor morphological differences in plants such as flower colour etc. and is not normally used by botanists today.

5. **Homonyms, synonyms and tautonyms**

Homonyms refer to the same name being applied to different plants. This has occurred in the past when botanists were not able to communicate with each other as easily as they are able to today. Only one plant with the same name can be accepted as being correctly named, the other plant must be given a new name. Synonyms refer to old or redundant names given to a plant, eg. *Acacia baileyana* is the old name for the Cootamundra wattle, the new name is *Racosperma baileyanum* (F.Muell.)Pedley, Austrobaileya 2:345 (1987) cited in Volume Four of the New Zealand Flora. Tautonyms are when the specific epithet and the generic epithet have identical names. Under the six guiding principles of the ICBN mentioned above points two, three and four deal with these problems. Where names do not conform to the guidelines in the ICBN the names are termed Nomen Rejieciendum and as such are invalid names which are rejected.

Validly published names
Must be published in a recognised professional journal or book that is likely to be read widely by botanists. It must be published with a suitable name which follows the rules of the ICBN, described in Latin and a holotype must be provided.

6. **Citation of authors names**

The inclusion of the author's name is usual in technical or scientific publications or reports since it makes for accuracy and clarity. It is not usual in semi technical or popular works. Botanical names can be followed by one or several personal names in full or in abbreviated form, eg. *Convallaria majalis* L. (L. = Linnaeus), *Coprosma astonii* Petrie.

The citation of authorities avoids confusion in instances of duplicated names (ie. when the same latin name has been applied by several botanists to different plants at different times), and it gives the name of the person who first described the particular plant. When the first personal name is in parenthesis, it refers to the person who first used the particular name. With increasing knowledge of plant relationships, a later author decides that the plant then formally publishes the change; the second authors name is subsequently cited

following the original author, eg. shepherd's purse was first described by Linnaeus as *Thlaspi bursapastoris;* it was late transferred to *Capsella* by Medicus in 1792, the correct citation then becoming *Capsella bursa-pastoris* (L.) Medic.

7. **Hybrids**

a) Interspecific hybrids

Hybrids between two (or more) species within one genus are written with a **x** (pronounced as cross) before the specific epithet to indicate this, eg. *Viburnum x burkwoodii*.. Both names are underlined (or italicised in the printed text). Parents of the cross in this case were *Viburnum carlesii* and *V. utile*.

b) Intergeneric hybrids

Hybrids between two different genera are preceded by a **x**, eg. the hybrid between *Fatsia japonica* 'Moseri' and *hedera helix* 'Hibernica is written x *Fatshedera lizei*. (The name *Fatshedera* is the equivalent of the new generic name which has been coined from *Fatsia* and *Hedera* - the two genera involved in the cross).

c) Graft hybrids

Graft hybrids follow the same conventions as those used for normal hybrids except that the **x** sign is replaced by the plus + sign. eg. as in the graft hybrid genus + *Laburnocytisus adamii* (*Cytisus purpureus* grafted into *Laburnum anagyroides*).

8. **Hierarchy of Ranks**

Horticulturists and practitioners tend to work at family level and below, botanists and scientists involved in classification and other issues work at all levels of the hierarchy.

Family names

Under the code family names are formed from the name of the type genus by adding **aceae**. eg. *Pittosporum* gives rise to Pittosporaceae, *Rosa* to Rasaceae etc. There are however eight families which are exceptions to this rule because they have been recognised as natural families of plants and have names which date back centuries. The following lists the eight along with alternative names ending in **aceae**. Use of either name is legitimate.

Original name	Modern alternative
Compositae (daisy family)	Asteraceae
Cruciferae (crucifer family)	Brassicaceae
Gramineae (grass family)	Poaceae
Guttiferae (hypericum family)	Clusiaceae
Labiatae (mint family)	Lamiaceae
Palmae (palm family)	Araecaceae
Papilionaceae (pea family) Leguminosae	Fabaceae * (see below)
Umbelliferae (carrot family)	Apiaceae

* Fabaceae (Leguminosae and Papilionaceae) are variously treated by different botanists. Some consider Fabaceae the equivalent of Leguminosae and then divide the family into three sub families Papilionoideae, Mimosoideae and Caesalpinioideae, others see these three as separate families in their own right Fabaceae or Papilionaceae, Mimosaceae and Caesalpiniaceae. Lumley and Spencer argue a case for dividing Leguminosae into Fabaceae - peas and beans, Mimosaceae - wattles and Caesalpiniaceae - cassias.

Table showing the hierarchy of the double yellow flowered *Kerria japonica* 'Pleniflora'

Nb. cultivar names have been included here to show there relative position. They do not come under the ICBN however, but the ICNCP which follows this section.

Taxon	Scientific name	common name	standardised ending
class	Angiospermae	flowering plants	
subclass	Dicotyledonae	dicots	
superorder	Rosidae	rose superorder	idae
order	Rosales	rose order	ales
family	Rosaceae	rose family	aceae
subfamily	Rosoideae	rose subfamily	oideae
tribe	Kerrieae	kerria tribe	eae
genus	Kerria	kerria	
species	japonica	japonica	
subsp. or var.			
cultivar	'Pleniflora'	double flowered cv.	

"The principles of the ICBN is predicated on a university accepted system of nomenclature that has for its objectives (1) the fixity of names, (2) nomenclatural clarity and freedom from ambiguity and (3) the avoidance of useless creation of names". Lawrence.

Key Points
Botanical names are universally accepted and treated as Latin.
Botanical names follow an agreed set of six principles.

c) **Cultivar names**

The term cultivar is a coined name from the words cultivated and varieties. In order for cultivars to be maintained they must have a human involvement as opposed to plants that fall within the auspices of the ICBN.

Cultivar names are given to plants that have been selected or bred with significant morphological differences from a plant species. New material with cultivar potential may be developed by chance sports or by deliberate crossing of species. Most vegetables, fruit and flower crops as well as many ornamental

plants which are grown today are selected cultivars. Cultivars may have better flowering or fruiting characters than the original species or they may flower or fruit earlier or later or may produce sweeter fruit or double flowers or the tree or shrub may be a particular form, or disease resistant etc. These differences are maintained by methods of cultivation. The methods in which plants may be maintained in cultivation may include vegetative propagation e.g. by tissue culture, taking cuttings, grafting or budding or by layering. Cultivars may in some cases be maintained by seed produced by inbreeding. Crossing homozygous lines to produce known F.1 hybrids with particular characters can also be given cultivar names.

International code of nomenclature for cultivated plants (ICNCP)

The ICNCP and the ICBN are separate codes which deal with different types of plants. Cultivar names are also governed by a set of rules and conventions. The ICNCP rules apply broadly to agriculture, forestry and horticulture.

Cultivar names differ from names covered by ICBN in that they are never underlined or italicised. They are preceded by the abbreviation cv. or the cultivar name is enclosed by single quotation marks. The cultivar name begins with an initial capital letter (upper case). eg. *Leptospermum scoporium* 'Tui' or *Leptospermum scoporium* cv. Tui.

The ICNCP specifies that after January 1st, 1959 cultivar names must not be latinised. Names which were validly published before this date may be retained eg. cultivar names like 'Argentea' or 'Lutea' etc. New cultivars developed since 1959 must be validly published. Cultivar names cannot be sets of numbers or letters of the alphabet, nor can they be the same as another cultivar already named belonging to the same genus. The cultivar name may not be allowed to create ambiguity et. *Tagetes patula* 'Rose' (which would create ambiguity with the rose in the genus *Rosa* etc.). Selecting an appropriate new cultivar name involves choosing a fancy name that is acceptable and the registration with a registering authority.

New Zealand native plants can be registered with the Royal New Zealand Institute of Horticulture currently based on the campus at Lincoln University. Plant patents on new cultivars can be arranged through the Plant Varieties Office which is based at Landcare Research, Lincoln. PVR or Plant Varieties Rights are granted to breeders and selectors of new cultivars of plants. These rights are paid for, but allow the breeder or selector exclusive rights to earn royalties on the propagation or use of protected material.

Cultivars of unknown origin

In some instances where cultivars have been selected from hybrids were the parentage is uncertain the cultivar name may be directly assigned to a genus. eg. *Begonia* 'Rodgeri', *Ilex* 'Maplehurst' etc.

Key Points

Cultivar names operate independently from the ICBN naming system.
Cultivar names may be latinised only if widely accepted before 1959.
Cultivar names are fancy names and are never underlined or italicised.

Specific References

The following references were helpful in the compilation of these notes and should be referred to for clarification of specific points of detail.

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AN INTERESTING CUSTOMER

Stephen Brown relates the following short story on one of his many interesting customers from Christchurch City:

A couple of years ago I received a complaint about Old Mans Beard in Opawa. On arriving at the property it was evident that there was a major problem. The plants were covering most of the trees and shrubs at the front of the property and beginning to climb onto the old house.

I knocked on the front door but received no reply and was surprised to see numerous blowflies crawling over the inside of the front windows. I could not see inside to see where they could have come from because the blinds were drawn. My first impression was that the occupant had died in the house and the blowflies had hatched out on the body.

Not to be deterred I made my way through the overgrowth to the back door and in response to my knock an old woman called out through a partially open window. I endeavoured to explain that she had a bad infestation of Old Mans Beard growing on the property and she would need to have it eradicated. Her only response was "I don't know what you are talking about and go away".

Being a person who can follow instructions I thought this was the best thing to do. On talking to the neighbours I found out that she was a schizophrenic and had been in and out of mental institutions. They said if you met her in the street she would talk to you and was quite pleasant but changed completely once she went inside her front gate and became a recluse.

I eventually located the woman's nephew and he agreed to eradicate the plants, but this was easier said than done because she wouldn't let him touch any of the vegetation.

Several methods of persuasion were used of leaving Old Mans Beard pamphlets and notes in the letter box and also writing a letter but all to no avail. Finally a notice was served to enforce the clearance of the Old Mans Beard but this must have had the effect of killing the old bird off because she died soon after which gave the nephew the opportunity to deal with the plants.

A matter of a few months later the old house was demolished and new flats were built on the property. I never did find out what the blowflys were breeding on, but I did find out that the woman's husband had died in the house a few years earlier and the police had to be called in at the time to extract the body.

HINEWAI RESERVE

Hinewai is a 980 hectare reserve in the south-eastern corner of Banks Peninsula. An initial block of 109 hectares was bought by the Maurice White Native Forest Trust in September 1987. Exactly four years later the Trust greatly enlarged the reserve through the purchase of Otanerito Station. The whole area is managed privately for the protection and restoration of native vegetation and wildlife, and conservation values are paramount. However, these are seldom in conflict with public access and enjoyment. Visitors are welcome, to walk the tracks, to look and wonder, and/or help in this grassroots conservation project. forward enquiries and bookings are necessary please if overnight accommodation is desired at the Visitor Centre.

The reserve occupies most of the Otanerito Valley, part of the Stony Bay Valley, and the upper bluffs of Stony Bay Peak overlooking Akaroa. It is situated on the eroded outer flank of the Akaroa Volcano, which ceased erupting basaltic lava some eight million years ago. The land falls steeply from the summit of Stony bay Peak at 806 metres above sea level, down to 20 metres above sea level at the Otanerito homestead. Permanent streams feature more than 30 waterfalls, some of which can be visited on the track network. The are sweeping vistas out across the Pacific Ocean, and across the hills and bays of Banks Peninsula.

The northern end of the reserve is well tracked with a network of about seven kilometres, linked to Akaroa by a walkway over Purple Peak Saddle, and down valley to the Otanerito homestead by a goo valley track. **Please keep to the tracks as strictly as possible** because of regenerating vegetation along and beyond them. Access is on foot only - no vehicles please, including mountain bikes. Please ask first about routes available to horses, and access to the bay beyond Otanerito homestead, and about unmarked routes to the summit of Stony Bay Peak and other places on the reserve.

About 40 percent of the reserve is under native bush of one sort or another. The tracks pass through red beech forest, kanuka, and second-growth mixed hardwood forest (fuchsia, mahoe, fivefinger, lacebark, etc.) with scattered podocarps (thin-barked totara and matai and kahikatea. The biggest trees are several centuries old. Three species of fern are common.

Extensive areas of gorse and young kanuka scrub serve as excellent nurse canopies for regenerating diverse forest species. Snow tussock occupies higher open ground and forms an attractive fringe along the road boundaries. Altogether 230 species of native vascular plants have been recorded within the reserve, plus many mosses, liverworts, lichens, algae and fungi.

Many native birds can be heard and seen by the observant visitor - bellbirds, brown creepers, tomtits, riflemen, woodpigweons, greywarblers, fantails, waxeyes, moreporks, harrier hawks, shining cuckoos (in season), kingfishers, black-backed gulls, paradise ducks, grey ducks, pipits, welcome swallows and spur-winged plovers. Introduced species are also common, especially redpoll, chaffinch, yellowhammer, greenfinch, goldfinch, starling, Californian quail, mallard, Australian magpie, dunnock, blackbird, thrush, skylark and rook.

Introduced mammals which may be seen are undesirable aliens - goats, hares, rabbits, brushtail opossums, hedgehogs, rats, mice, stoats, cats, ferrets and weasels.

Beautiful green geckos live in the kanuka, grey geckos and skinks in more open places, and eels share the streams with tiny native fish and insect larvae. There are many species of insects and spiders. Red admirals and monarchs are the most conspicuous of seven butterfly species. Tree-planting workparties may encounter giant earthworms up to 50 centimetres long, or fierce-looking (but harmless) weta.

WEEDS OR NOT - A CONSERVATION PERSPECTIVE
By Hugh D. Wilson

Just as one man's meat is another man's poison, so one man's valued plant species can be another's dreadful weed, and vice versa. A weed, after all, is simply an unwanted or undesirable plant, and people's wants and desires are diverse. This is not just a simple truism for me. I look after a 1000 hectare nature reserve in the south-east corner of Banks Peninsula, surrounded by hilly farmland. A major part of our management strategy is to leave gorse and broom covered land undisturbed, ungrazed, unburnt, unsprayed, (unkempt some of our neighbours used to call it) to allow it to act as a nurse canopy for the regeneration of native forest. After nine years, vigorous establishment of native bush is so obvious that nearly all the doubters and skeptics are falling silent.

We have an extra bonus. The regenerating lands are far from unproductive, even in a restricted economic sense; Hinewai's vegetation and the diverse wildlife dependent on it are both an integral part of the Banks Peninsula Track, a co-operative rural venture which has grown into a significant player in the local economy. The point is, heretical as it might sound to some Noxious Plants Officers, gorse and broom are useful to us.

Of course we have substantial boundaries with neighbouring farms, and we have no argument with the requirement that gorse and broom be kept back 10 metres from boundary fences. A large proportion of our time is spent doing so. We clear by hand, cutting gorse and broom to ground level and poisoning all stumps with glyphosate, then mulching all bare ground with the cut scrub. Although time consuming, these methods hit only the target species. A thick sward of grass and fern grows rapidly through the mulch, suppressing virtually all regeneration of the light-demanding scrub weeds but allowing the encroachment of shade tolerant natives such as mahoe (*Melicytus ramiflorus*) and karamu (*Coprosma robusta*). These species have the added advantage of fire-resistant foliage; fire is our biggest fear. Thus we are in the interesting position of regarding gorse and broom as pesky weeds on our boundaries (and tracks), and as valuable nurse canopy everywhere else.

I won't pretend that this has all been a smooth and easy path to follow. We have collected some flak from neighbours and from Noxious Plants Authorities, some of it fully justified because we anxiously felt we needed more time than other's needs easily allowed. On our part, we have at times felt a bit disgruntled at what seemed a heavy bias towards agricultural needs, and a dismissal of the different needs of conservation management. Reading the last few issues of 'Protect" and the Canterbury Regional Council's recent pamphlet "The Natural Succession Option" makes me realise that there is in fact increasing recognition of conservation needs as well as agricultural ones, notably in regard to gorse, broom and Old man's beard clematis (*Clematis vitalba*).

As a tiny contribution to a wider viewpoint, I thought it might be useful to consider a few of the weed species relevant to our situation on Hinewai Reserve, besides gorse and broom.

Clematis vitalba **(Old man's beard)**

The smothering abilities of this naturalised climber can have a serious impact on disturbed regenerating forest. There are infestations within a few kilometres of Hinewai's boundaries, and we found (and immediately destroyed) one young plant, neither flowering nor seeding, within the Reserve in 1996. We are constantly on the lookout for this species and would spare no effort to eliminate any further plants found. At the same time we are optimistic that Hinewai will be increasingly resistant to invasion as native regeneration thickens.

Acer pseudoplatanus **(Sycamore)**

Mercifully absent from Hinewai, this deciduous hardwood tree is widespread on Banks Peninsula. It represents a major threat to regenerating native forest because of it's abilities to regenerate in deep shade, and form quite high canopies, though luckily not as high as the tallest native trees. Although spread by wind , the seeds do not often travel very far. Sycamore is unlikely to invade Hinewai, but it is another species which we diligently watch for.

Fraxinus excelsior **(Ash)**

Similar in its ecological behaviour to sycamore but apparently less invasive, ash is widespread on Banks Peninsula and sometimes included in forestry proposals. Saplings were removed from near Otanerito homestead on the Reserve in 1991, and otherwise Hinewai is free of the species.

Pinus radiata **(Monterey pine)**

Monterey pine is by far the most popular tree for forestry plantations on Banks Peninsula, as elsewhere in New Zealand. It disperses widely by wind, and establishes whenever opportunity arises, especially on open sites on bluffs. It is tall and long-lived, but does not regenerate under it's own shade, and in the long term ungrazed native understoreys would succeed it as the first generation of pines died of old age or disease. On Hinewai we quickly removed all wilding pines and watch out for any new establishment. Opportunities for pine to colonise will diminish as native regeneration thickens. This is fortunate because neighbouring landowners are planting pines right up to our boundaries on several fronts. An 11 hectare pine plantation on the Reserve is scheduled for harvesting in the 1997-8 summer, and the site will then be allowed to revert to native regeneration. We expect that in the first few years we will have to put in quite an effort to remove pine regeneration from this site.

Crataegus monogyna **(Hawthorn)**

Hawthorn grows to within a kilometre of our boundaries but we have not found it on the Reserve to date. Birds disperse the seed widely and we keep a constant lookout for the species. However, the undisturbed vegetation cover of Hinewai will be increasingly resistant to Hawthorn invasion.

Leycesteria formosa **(Himalayan honeysuckle)**

This is abundant on Hinewai, bird dispersed, and relatively shade tolerant. At first it seemed to be our worst weed. Indeed it probably is, but it underlines how fortunate we are, because it is quite benign. Careful observations and monitoring over nine years show that it is readily outcompeted by native fuchsia, wineberry and mahoe, although for a time it can form quite dense stands. As with shade tolerant native species it is able to grow under and through gorse and broom, which it suppresses, but in turn is suppressed by native species. It provides abundant food for birds from late summer into the winter. We are constantly pulling seedlings and saplings along track sides (they come out easily) but reserve-wide control would be completely impractical, apart from leaving things to successional change.

Himalayan honeysuckle
Leycesteria formosa

Sambucus nigra **(Elder)**

Elder is scattered throughout the Reserve in regenerating bush, but is absent from old-growth forest remnants. Like Himalayan honeysuckle it is shade-tolerant, fast growing, bird dispersed, but also persists under taller native second growth canopies. But nowhere on Hinewai could it be considered an aggressive invader. We have to accept it as a widespread, benign, exotic element in the vegetation. Anyway, reserve-wide control would be completely impractical.

Prunus spp **(Plums and Cherries)**

Wild cherry (*Prunus avium*) and cherry plum (*P. cerasifera*) are close to our boundaries. If located within Hinewai we would attempt to eradicate them completely.

Cotoneaster spp

We have removed a few plants of *Cotoneaster glaucophyllus* from within the Reserve. An infestation of *C. simonsii* nearby above Le Bons Bay makes us nervous. There are wild plants of *C. lacteus* also in our vicinity. We would prefer to keep Cotoneaster out of the Reserve, and keep a constant lookout for it. Birds can disperse it widely.

***Rubus echinatus*(Blackberry)**

Blackberry is common on Hinewai and has shown some increase since grazing was removed. It is likely to decrease as native succession proceeds. Meanwhile we remove it from track sides and from the rare sites where it occurs on boundaries. Much of the blackberry on Hinewai is infected with blackberry rust, *Phragmidium violaceum*, and many plants are severely debilitated by it.

***Berberis spp* (Barberry)**

Three species are in our vicinity (*B. glaucocarpa, B. darwinii and B. vulgaris)* but I have never seen any within our boundaries. We would go for eradication if we found any.

***Tradescantia fluminensis* (Wandering jew)**

This dense, shade tolerant ground cover seriously suppresses native forest -floor vegetation. Down at Otanerito homestead Tim Galloway and Sara Kooy put in a sustained effort to eradicate the only known infestations on the Reserve. We want to keep this species out of Hinewai at all costs.

***Lonicera japonica* (Japanese honeysuckle)**

We would very much like to keep this climber out of the reserve too; it is locally common in the vicinity, and bird dispersed.

***Muehlenbeckia australis* (Pohuehue)**

This native climber behaves a bit like Old man's beard clematis in regenerating bush, disturbed second-growth forest, and on forest margins. Certainly it can smother small trees, and form persistent tangled thickets. But in our case, with increasingly undisturbed successional vegetation, with disturbance by grazing animals virtually eliminated, and with our policy of minimal interference, we are happy to let nature take her course with *Muehlenbeckia*, as with all other native vines. It would be ludicrous to attempt to 'control' *Muehlenbeckia* across 1000 hectares even if it were desirable. At the same time I do confess to rescuing good-looking young native trees near our buildings, and along tracks, by crawling into their base with a pair of loppers and cutting the vines near ground level; they sprout again, but one such attack usually gives the vines such a fright the rescued tree is away laughing. We also make some effort to keep *Muehlenbeckia* in check in our two aboreta and in the limited areas of planted-up ungrazed pasture. *Muehlenbeckia* thickets, incidentally, make excellent bird habitat. Nature knows what she is doing.

***Dryopteris filix-mas* (Male fern)**

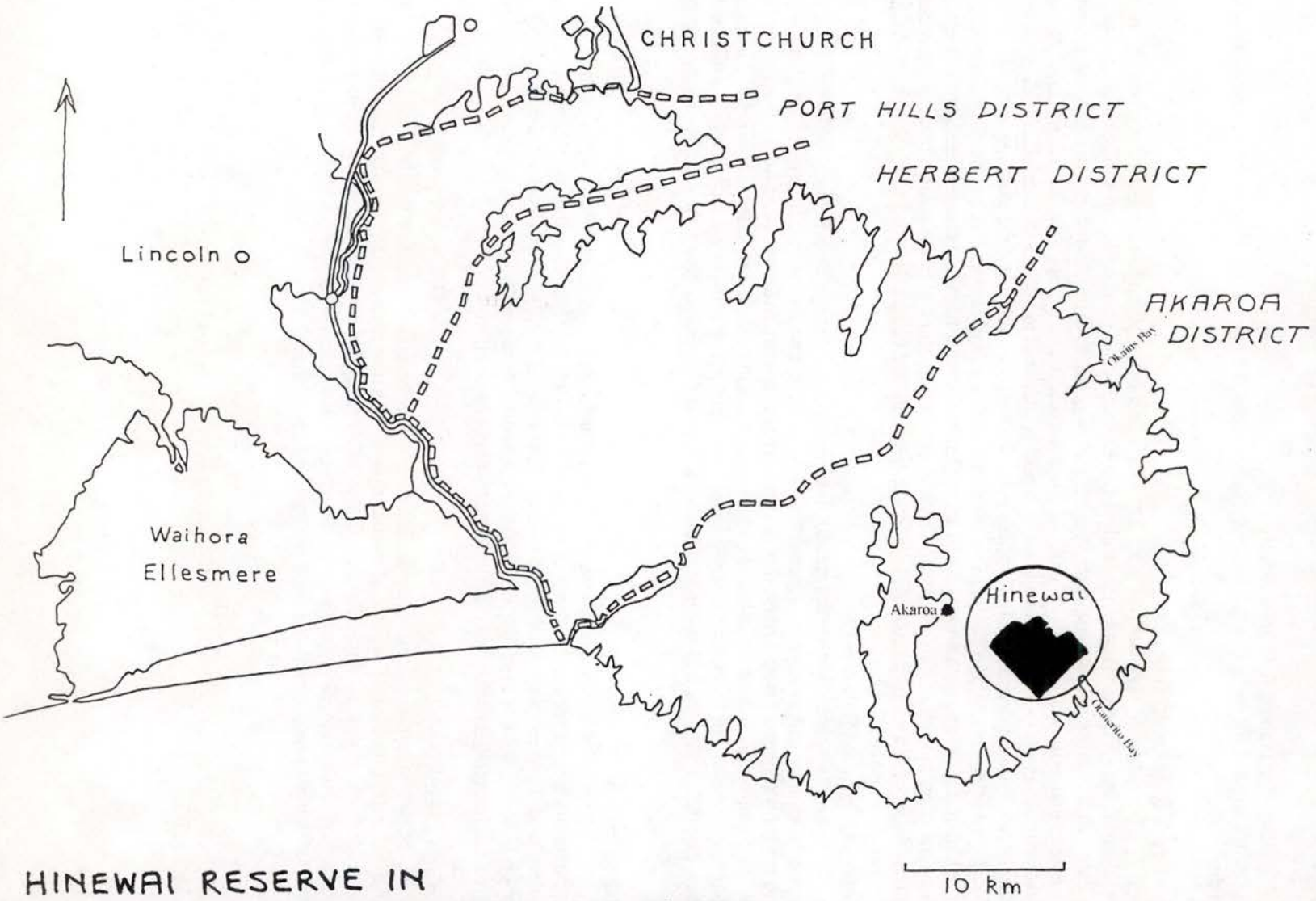
This is an exotic fern species steadily insinuating itself through the whole of Banks Peninsula. On Hinewai it is still uncommon, but widespread. I would love to keep it out, and am continually pulling out plants whenever I see them, but if I was honest I would admit that the battle is already lost. To anyone but a fern enthusiast, male fern would look like a native fern; indeed a half-baked fern enthusiast might confuse it with the native gully fern, *Pneumatopteris pennigera*, and pull out the wrong thing! I suspect that male fern will not actually displace native species to any serious extent, but will just add one more element to the 60 fern species that form such a striking part of Hinewai's vegetation.

***Senecio jacobaea* (Ragwort)**

This species is of no consequence to us at all and would soon enough be crowded out by burgeoning native vegetation. But it is on our hit list wherever we see it just in case the seeds blow into neighbouring farmland. Over the last decade we have removed hundreds of rosettes. It is now three years since I encounted any ragwort at flowering stage on Hinewai, and it is extremely rare to find even non-flowering rosettes. Similarly a small infestation of nodding thistle *Carduus nutans* was completely eliminated without much effort.

Biological Control

One last comment: several biological control agents against gorse are thriving on Hinewai. I don't regard them as deleterious to the role of gorse as a nurse canopy for native regeneration. Any reduction in gorse vigour due to gorse spider mite, thrips, seed weevils, etc., is only likely to speed up its replacement by native species. Hinewai co-operates fully with regional programmes of biological control against non-native species, and indeed has proved a useful undisturbed experimental and study site by Landcare scientists.



HINEWAI RESERVE IN
BANKS ECOLOGICAL REGION

About the Author

Hugh Wilson is a free-lance botanist and the manager of the Hinewai Reserve. He has received international recognition as a biologist and in 1991 he was awarded the H.H. Bloomer award, the first southern hemisphere scientist to receive this honour. It was awarded on the basis of Hugh's long-standing commitment to New Zealands botany and for Hugh's concern for the conservation of New Zealands flora. He has done extensive field surveys, produced vegetation maps, written many beautifully illustrated field guides for specific regions of New Zealand, notably the Mt Cook and Stewart Island regions. He has grid surveyed the Banks Peninsula and is preparing a field guide for this region also. Hugh has tramped and botanisted extensively in the South Island and participated in two mountaineering and scientific expeditions to the Peruvian Andes. Hugh is well known for his mobility on his bicycle and can sometimes be seen on the roads around Banks Peninsula. It's not sure whether he has competed in the coast to coast marathon but he has certainly been seen at the monument at Arthurs Pass, mounted on his bike and ready to make it to Christchurch by the evening.

Hugh Wilson

THE UPTAKE, DISTRIBUTION AND ACTION OF HERBICIDES

By Dr A.S. Crafts

(Part One of a series of Four)

A Series of Articles Describing the Physical;, Physiological and Biochemical Processes Involved in the Killing of Weeds and the Behaviour of Chemicals.

Plant physiologists have disagreed for over 100 years on the nature of the mechanism by which food materials are distributed by plants. Only recently has evidence from two seperate sources proven that the mechanism is one of mass or pressure flow, that is, a mechanism in which the food molecules move along the conducting channels in solution in water, and that the foods and water flow en masse.

The two types of evidence are as follows:

(1) When labelled tracers are applied to leaves of plants they diffuse across the epidermis, migrate to the vascular tissues of the veins and move either acropetally to the leaf tip, basipetally along the veins to the petrole, stem and roots, or possibly they may move in both directions.

From plant phosiological deduction we know that the acropetal movement is in the xylem or woody part of the vascular system and that the basipetal flow is in the phloem tissue, in the sieve tubes. Now, if one applies the tracer to different leaves along an elongated stem we find that, applied to a basal leaf movement is basipetal into the roots. If applied to a median leaf movement is both basipetal into roots and acropetal to the upper stem and young growing shoot tips

If application is to a mature leaf near the tip of the stem movement is only upward to the growing shoot tip. Finally, if application is to a young expanding tip leaf there is no export of tracer from that leaf.

Meanwhile a fundamental observation is that in moving from a single mature leaf either down into roots, up to a growing shoot tip, or both directions, the tracer consistently by-passes all other mature leaves. Labelled aminotriazole and 2, 4-D both show this pattern of distribution. The only logical interpretation of this pattern of distribution is that the tracer, in entering the phloem conductors, is picked up by the stream of food materials moving from the treated leaf and carried to regions where these foods are being used.

We know from studies on both food movement and tracer movement in plants that the velocity of movement often ranges from 50 to 100 centimetres or more per hour. A mass or pressure flow mechanism is the only type that will account for this distribution pattern and velocity range.

(2) For over 100 years botanists considered the strands of phloem and xylem to consist of solid cytoplasm, hence to constitute structures of high resistance to rapid mass flow. The impression that the sieve strands were solid was gained from microscopic sections of stem segments cut in the preparation of the material for study under the microscope.
However, recent work with the electron microscope by Esau, Chambers, Engleman, Evert and others proves that the massive proto-plasmic strands that traverse the sieve plates of the phloem of plants are tubular in nature, enabling the sap contained in the lumina of the sieve tubes to flow en masse from element to element. This means that there is no physical barrier in the sieve tubes to mass flow of the asimilate stream within them.Their open tubular aspect is gained by killing the phloem tissue intact and cutting for sectioning after the cells are dead. In this way the plugging action inherent in cut phloem is avoided.

SOURCE TO SINK DISTRIBUTION.

The source to sink distribution pattern of labelled herbicides was observed by Mason and Maskell in their classical studies on food transport in cotton, and by many other plant physiologists. Since then it has been observed by many scientists studying food movement and tracer distribution in plants. In the Botany Department at Davis we have seen it in field bindweed (Convolvulus arvensis) cotton, cucumber, barley, black bindweed (Polygonum convulvulus) a great number of woody species, and several aquatic species. Figure 1 shows this pattern as seen in black bindweed. Figure 1a shows the autograph of a plant treated on a basal leaf; Figure 1b a plant treated on a median leaf; Figure 1c one treated on the uppermost mature leaf; and Figure 1d a plant treated on a young expanding tip leaf.

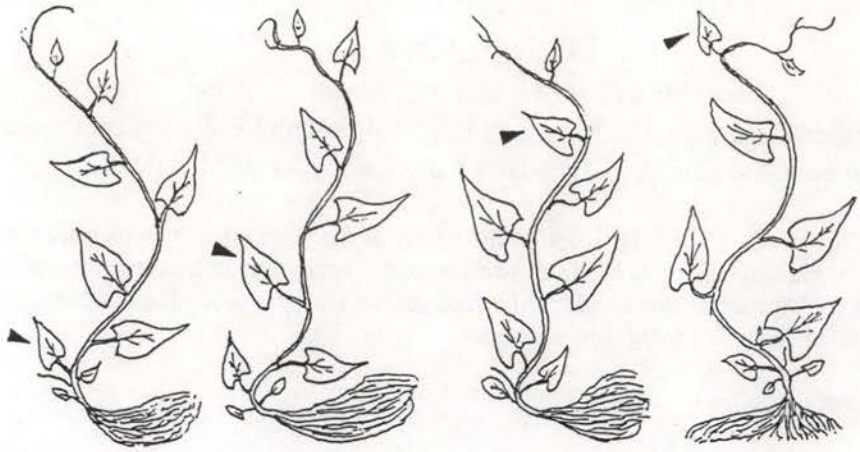


Fig 1a Fig 1b Fig 1c Fig 1d

Figure 1

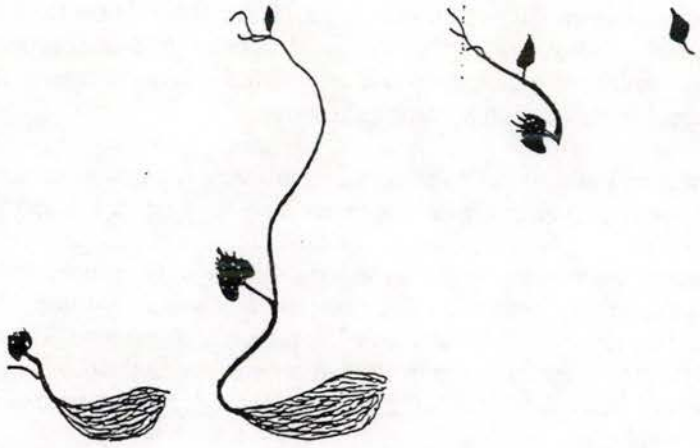


Figure 1 Autoradiographs

Figure 1 Autoradiographsand plants *(Polygonum convolvulus)* treated with C14 labelled 2.4-Don different leaves. Fig 1a, plant treated on lower leaf. Fig 1b, plant treated on a median leaf. Fig 1c, plant treated on the uppermost mature leaf. Fig 1d, plant treated on a young growing tip leaf. Drawings are of plants above (arrows showing treated leaves), and of autoradiographs below.

Munch described a model for this mechanism in 1930. Figure 2 shows this model, which is often used in plant physiology classes to demonstrate the mechanism. This model will continue to move sugar molecules in solution from left (high concentration cell) to right (low concentration cell) so long as a concentration gradient exists between cells. Velocity of flow varies directly as the difference in concentration and inversely as the as the resistance to flow.

In the plant Munch compared the high concentration cell to the sieve tubes in leaves or other regions of the synthesis of osmotically active substances, the low concentration cell to the phloem in regions of food utilisation such as meristems, fruits, storage tissues, roots etc.The connecting tube exemplifies the mature functioning sieve tubes of the phloem. The source of water to this differential osmotic system is the xylem, which parallels the phloem throughout the plant.

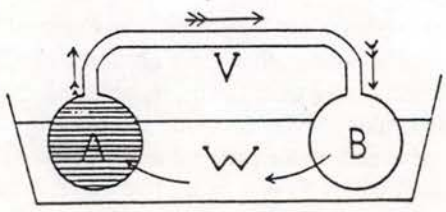


Figure 2

Figure 2: Diagram of the differential osmotic model proposed by Munch to explain mass flow in the phloem
A. cell having a high osmotic concentration. B. cell of low osmotic concentration. W. water. V. the connecting tube through which mass flow of solution takes place. 'V' is comparable with the mature functioning sieve tubes of the phloem

The solution of this problem of the mechanism of food movement in plants and the ancillary discovery that labelled tracers, including herbicides, move along with foods is of great importance in weed control because it defines in in in detail the necessary conditions for translocation in perennial weeds and woody plants.

To successfully absorb and translocate an applied herbicide a plant should be healthy and it should be carrying on active photosynthesis. Soil moisture should not be limiting and the roots should be growing or storing foods. Application should cover the lower foliage very thoroughly. It should be timed so that food movement to the roots is strong. Herbicides applied to the upper foliage or applied during active flowering and fruiting will be distributed in the upper regions of the plant and may have little or no effect on crown or root control.
Thus research with labelled tracers, and basic studies in the fields of plant physiology have proved that successful use of herbicides depends upon knowledge of the baasic physiological and biochemical processes that determine synthesis and distribution of food materials in plants. Future papers on this subject will illustrate and explain basic considerations in some detail.

ABOUT THE AUTHOR

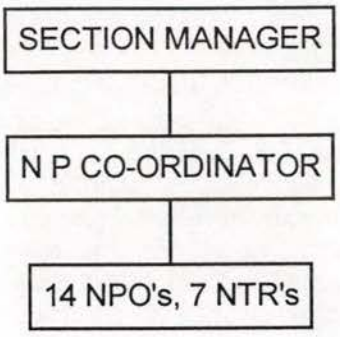
Dr Crafts received a B.S. degree in botany at the University of California, Berkeley, in 1927, and his Ph.D in Plant physiology at the same university in 1930. He did considerable research work at this University at the Davis Research Centre. In 1959 he was chairman of the Department of Botany there. He hold various fellowship honours from many Institutions and has written four books, one of which is on weed control, and has also written 130 scientific articles on the same subject. His main interest has been in research and development in the techniques of sudying the uptake and distribution of herbicides, and herbicide behaviour in soils. He travelled to New Zealand in 1964 and gave a paper to the N.Z. Weed and Pest Control Conference at Ruakura, Hamilton, and also gave a series of lectures during that trip. These articles were written as a result of that visit.

This article is from the SERVICE Summer 1965-6 magazine published by Ivan Watkins Dow Ltd. and was researched by A.J.B. Banks, Biosecurity Officer, Canterbury.

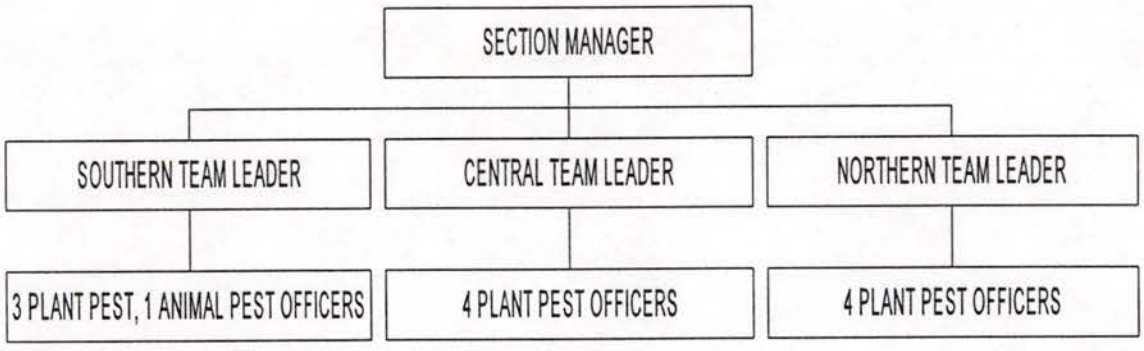
THE CANTERBURY SURVIVORS!

As most of you will know 1996 was a rough year for Canterbury NPO's. Having known for some time that job losses were imminent the process finally got underway around June, dragged on until applications were called for in mid October and then suddenly occurred. After the restructure 13 of the 21 NPO's and Nassella Tussock rangers were left.

The structure was changed from:



To:



<u>So who is left and where are they?</u>

One of the NTR's was on an annual contract which had not been renewed, so that improved the odds slightly!

The teams are as follows:

Southern Team based at Timaru:

Leader -	Graeme Sullivan	(ex Senior Inspector Animal Pests)
	Phil Crotty	
	Terry Broughton	
	Brent Glentworth	(Animal Pests, Twizel)
	Jim Kennard	

Central Team based at Christchurch

Leader	Rob McCaw
	Jock Bulman (Little River)
	Errol Barnes (Darfield)
	Stephen Brown
	John Thacker

Northern Team based at Amberley

Leader	Laurence Smith
	Jan Crooks (Cheviot)
	Noel Crump (Cheviot)
	Tony Banks
	John Leeuwerik

You will note that some familiar names are missing. Garry Kerr, Russell Green and Dave Rossiter all took voluntary redundancy. John Clapham was not offered a position nor were the NTR's Jim Kennard, John Hope, Tyron Murphy or Bob Cain. Jim eventually accepted the vacant position in Timaru.

How does the new set-up work?

Canterbury took the Biosecurity Act to heart and concluded that few plants would be funded by a regional rate. A mixture of uniform rural rate, pest district rating and general rate was introduced with the mix varying for different plant pests. This had the effect of shifting the rate into the rural sector. As you can imagine the howls came thick and fast! Many submissions stated that non-compliers should be paying for their lack of compliance.

Consequently we are moving to a system where if work is not done by the required date then an account will be sent for inspection costs. While this has radically changed our role it does have an advantage in that there is no argument about individuals being too hard or soft.

Liaison Committees

These committees have been set up to provide feed back to council on the level of activity and funding required in their areas. While there is a concern that their priority will be to lower rates there is a real possibility that they may feel that not enough work is being done in their area and that they are prepared to provide resources for a bit more.

National Generic Pest Management Strategy
Distribution Control List
&
Implementation by Councils

Pest plants intended to be prohibited from sale, propagation and distribution nationally and implementation by Regional Councils, Unitary Authorities and the Chatham Islands Council

by
P K Russell
Environmental Weed
Management Services
R D 3, Akaroa 8161

for
Royal Forest and Bird Protection Society of New Zealand (Inc.) & other interested parties

3 March 1997

Ref.: 1-97

Contents

Tables

1. Introduction

Until recent years, there have been few restrictions on the sale, propagation and distribution (hereafter referred to as "sale etc.") of environmental weeds[1] in New Zealand. Under the Noxious Plants Act 1978, Councils throughout the country declared many plants to be "noxious", but most threatened agricultural production, hydro-electricity generation or public health and safety. The sale etc. of noxious plants was prohibited under the Act, but only in the region/s (or parts thereof) they were declared noxious in. Little further attention was given to the concept of prohibiting the sale etc. of noxious plants. This may not have been an issue because most, if not all noxious plants were not normally considered to be aesthetically pleasing or otherwise desirable. Many environmental weeds, on the other hand, happen to be desirable to many people in one way or another[2], regardless of whether or not such plants are known to be serious weeds. This has contributed to the scenario that many environmental weeds have been merchandised throughout New Zealand[3].

With a great deal of effort by several Noxious Plants Officers, the Royal Forest and Bird Protection Society of NZ (Forest and Bird) and others, three plants were eventually declared noxious because of the threats they pose to conservation values[4]. *Clematis vitalba* (old man's beard) was declared noxious in most parts of most regions during the last 10 years[5]. Previously, it had been widely sold as an ornamental plant (Jack Craw, pers. comm.). In 1991 *Hedychium flavescens* (yellow ginger) and *H. gardnerianum* (kahili ginger) were declared noxious in the Auckland and Northland regions - meaning their sale could, and has, continued legally in other regions (pers. obs.).

Numerous other pest plants[6] have also been sold, propagated and distributed in recent times. As a means of addressing this serious problem, the "Forest Friendly Award" scheme was initiated in 1993 by Forest and Bird in conjunction with the Institute of Noxious Plants Officers (Craw, 1994). The scheme encouraged plant merchants to *voluntarily* agree not to sell or display several environmental weeds and was endorsed by Regional Councils, Department of Conservation, Conservation Boards, QEII National Trust, NZ Botanical Society and the NZ Institute of Landscape Architects.

Forest Friendly Awards were enthusiastically accepted by several hundred merchants throughout the country (Craw, 1996). Accompanying publicity is likely to have raised general awareness that many introduced "ornamental" plants threaten native communities. The scheme was somewhat limited in its effectiveness because some merchants, most notably the Palmer's Garden Centres, refused to cease merchandising several environmental weeds. The scheme did, however, provide the impetus for Councils to *prohibit* the sale etc. of environmental weeds, as they are now authorised to do under sections 52 and 53 of the Biosecurity Act 1993.

In 1995 the "National Generic Pest Management Strategy Distribution Control List"[7] (hereafter referred to as "National Generic List" or "NGL") was compiled by Jack Craw (Northland Regional Council) and Lance Vervoort (Auckland Regional Council). The list contains many environmental (and other) weeds and the intention was that all of these were to be prohibited from sale, propagation and distribution by all Councils[8] throughout New Zealand through inclusion in their Regional Pest Management Strategies (RPMSs). The list was completed with the assistance of Steve Hix (Otago Regional Council) for the Biosecurity Technical Advisory Group[9] and was devised through consultation with botanists, ecologists, conservationists, Noxious Plants Officers and the Nursery and Garden Industry Association (NGIA). The NGL is not an exhaustive list of pest plants[10], but if all Councils adopt it in its entirety, it will

significantly increase the ability to protect and restore conservation values in New Zealand. It is intended that other plants will be added to the NGL in future, as the need to do so arises.

This report was prepared to:

- provide an analysis of the level of implementation of the NGL by Councils; and
- to draw attention to the need for all Councils to adopt the NGL in its entirety.

A table displaying the level of implementation of the NGL by Councils is provided along with an analysis of this data. This is followed by a discussion about the level of implementation displayed by each Council and the need for a "national ban" approach. The flawed assumption that climate will strictly limit the distribution of pest plants is discussed along with the fact that some amount of pressure has been placed on Councils by plant merchants. The inaccurate specification of some items on the NGL by several Councils is considered. Two common arguments against prohibiting the sale etc. of pest plants are discussed. The ability of Councils to amend Regional Pest Management Strategies is considered and several recommendations are provided.

2. Recommendations

- **All plants on the National Generic List should be prohibited from sale, propagation and distribution by every Council.** The NGL should be included in its entirety in all Regional Pest Management Strategies, preferably under the title "Nationally Prohibited Pest Plants" - a more appropriate title than the commonly used "National Surveillance Plants". This will mean that a generic list will be adopted nationally, effectively creating a national strategy (as intended). This will help to minimise the natural and human-aided dispersal of environmental weeds throughout New Zealand.
- **Councils should be looking to *add* plants to the list**, not to remove them. Councils seriously concerned about the protection and restoration of conservation values should, for example, consult DoC about what other plants present a serious threat to conservation values. This will help to minimise the natural and human-assisted dispersal of environmental weeds throughout New Zealand.
- **All plants should be listed primarily by their scientific names** (in alphabetical order). Common names for all plants should also be listed in an index which refers the reader to the appropriate section/s of the RPMS (many plants will have more than one common name). If applicable, details must also be provided regarding the inclusion/exclusion of cultivars/ subspecies/varieties/hybrids, specified exactly as they are on the National Generic List. This will help to minimise conflict with merchants, avoid problems with enforcement due to inaccurate specification and make it easier for all parties to ascertain what regulations apply to any plant in any region.
- **All plants addressed in a strategy should be included in a "summary of pest designations"** which displays the status of each plant and where they are referred to in the strategy (e.g. Auckland and Waikato Regional Councils' Strategies). Accompanying this should be the statement that all plants in the RPMS are banned from sale, propagation and distribution. This will also make it easier for all parties to ascertain what regulations apply to any plant in any region.
- In future, **the number of preliminary lists of "Prohibited Plants" should be kept to a minimum, each should be clearly labelled as a "Provisional List" and each Council should receive a "Final List"** which is clearly labelled as such. This will help to avoid confusion about which list applies and will reduce the likelihood of the wrong lists being included in Regional Pest Management Strategies.
- **Noxious Plants/Biosecurity Officers should be familiarised with the identification of environmental weeds, their effects and control methods.** This should include familiarisation with relevant botanical nomenclature (e.g. "cultivars", "subspecies", "varieties" and "hybrids").

3. Implementation of National Generic List by Councils

Table 1: National Generic List[11] and its implementation by Regional Councils, Unitary Authorities and the Chatham Islands Council.

Scientific name[12]	Common name[13]	Auckland	Bay of Plenty	Canterbury	Chatham Islands	Gisborne	Hawke's Bay	Manawatu-Wanganui	Marlborough	Northland	Otago	Southland	Taranaki	Tasman-Nelson	Waikato	Wellington	West Coast
Acaena agnipila	Sheep's bur	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X
Acmena smithii	White monkey apple	√	√	√	√	√	√	√	X	√	X	√	X	√	√	√	X
Ageratina riparia (Eupatorium riparium)	Mistflower	√	√	√	√	√	√	√	!	√	X	√	√	√	√	√	X
Alternanthera philoxeroides	Alligator weed	√	√	√	√	√	√	!	√	√	√	√	√	√	√	√	X
Andropogon virginicus	Broomsedge	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X
Anredera cordifolia	Mignonette/Madeira vine	√	√	√	√	√	√	√	!	√	X	√	√	√	√	√	X
Araujia sericifera	Moth plant	√	√	√	√	√	√	!	√	√	X	√	√	√	√	√	X
Arctium minus	Burdock	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X
Asparagus asparagoides	Smilax	√	√	√	√	√	√	√	√	√	X	√	√	√	√	√	X
Asparagus scandens	Climbing asparagus	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X
Baccharis halimifolia	Baccharis	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X
Bartlettina sordida	Bartlettina	√	√	√	√	!	√	!	√	√	X	!	√	√	√	√	X
Berberis glaucocarpa	Barberry	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X
Buddleja davidii (excluding hybrids)	Buddleia	√	√	√	√	√	√	X	!	√	√	!	√	!	√	√	X
Calicotome spinosa	Spiny broom	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X
Calluna vulgaris (excluding double-flowered cvs)	Heather	√	!	√	√	!	√	!	√	√	X	√	√	√	√	√	X
Calotis lappulacea	Bur daisy	√	√	√	√	√	√	√	√	√	√	!	√	√	√	!	X
Carduus acanthoides	Plumeless thistle	√	√	X	√	√	√	√	√	√	√	√	√	√	√	√	X
Carduus nutans	Nodding thistle	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Carex longebrachiata	Australian sedge	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X
Carthamus lanatus	Saffron thistle	√	√	√	√	√	√	√	√	√	√	√	√	!	√	√	X
Ceratophyllum demersum	Hornwort	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Cestrum parqui	Green cestrum	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X
Chondrilla juncea	Skeleton weed	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X
Chrysanthemoides monilifera	Boneseed	√	√	√	√	√	√	!	√	√	√	!	!	√	√	√	X
Clematis vitalba	Old man's beard	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Cobaea scandens	Cathedral bells	√	√	√	√	√	√	√	√	√	X	√	√	√	√	√	X
Conium maculatum	Hemlock	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X
Cortaderia jubata	Purple pampas	√	√	√	√	√	√	√	√	√	X	√	√	√	√	√	√
Cortaderia selloana	Pampas grass	√	√	√	√	√	√	√	√	√	X	√	√	√	√	√	√
Cotoneaster franchettii	Cotoneaster	√	√	√	√	√	√	√	√	√	X	X	√	√	√	√	X
Cotoneaster glaucophyllus	Cotoneaster	√	√	√	√	√	√	√	√	√	X	√	√	√	√	√	X
Crataegus monogyna	Hawthorn	√	√	√	√	√	√	√	√	√	!	√	√	√	√	√	X
Cyperus rotundus	Nutgrass/ purple nutsedge	√	√	√	√	√	√	√	√	√	!	√	√	√	√	√	X
Cytisus scoparius	Broom	√	√	√	√	√	√	√	√	√	!	√	√	√	√	√	√
Dipogon lignosus	Mile-a-minute	√	√	√	√	√	√	!	!	√	X	!	!	√	√	√	X
Egeria densa	Egeria oxygen weed	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Elaeagnus x reflexa	Elaeagnus	√	√	!	√	√	√	√	√	√	√	√	√	√	√	√	X

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Scientific name	Common name	Auckland	Bay of Plenty	Canterbury	Chatham Islands	Gisborne	Hawke's Bay	Manawatu-Wanganui	Marlborough	Northland	Otago	Southland	Taranaki	Tasman-Nelson	Waikato	Wellington	West Coast
Equisetum arvense	Horsetail	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X
Eragrostis curvula	African love grass	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X
Erica lusitanica (excluding double-flowered cvs.)	Spanish heath	√	√	X	√	√	√	!	√	√	!	!	!	√	√	√	X
Erigeron karvinskianus	Mexican daisy	√	√	√	√	√	√	√	√	√	X	√	X	√	√	√	X
Euonymus japonicus	Japanese spindle tree	√	!	√	√	√	√	√	√	√	√	√	√	√	√	√	X
Ficus rubiginosa	Port Jackson fig	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X
Galega officinalis	Goats rue	√	√	√	√	√	√	√	√	√	X	√	√	√	√	√	X
Galeobdolon luteum	Artillery plant/aluminium plant	√	√	√	√	√	√	√	√	√	X	√	√	√	√	√	X
Gymnocoronis spilanthoides	Senegal tea/temple plant	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X
Hedychium flavescens	Ginger; yellow	√	√	√	√	√	√	√	√	√	X	√	√	√	√	√	X
Hedychium gardnerianum	Ginger; kahili	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X
Houttuynia cordata	Houttuynia/chameleon	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X
Hydrilla verticillata	Hydrilla	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Hydrocleys nymphoides	Water poppy	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X
Hypericum androsaemum	Tutsan	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X
Hypericum perforatum	S^{t} John's Wort	√	√	√	√	√	√	√	√	√	√	√	X	√	√	√	X
Ipomoea indica	Blue morning glory	√	√	√	√	√	√	√	√	√	X	√	√	√	√	√	X
Iris pseudacorus	Yellow flag	√	√	√	√	√	√	√	!	√	!	!	√	√	√	√	X
Lagarosiphon major	Lagarosiphon oxygen weed	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Lantana camara var. *aculeata*	Lantana	√	√	√	√	√	√	!	!	√	X	√	√	√	√	√	X
Leycesteria formosa	Himalayan honeysuckle	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X
Ligustrum lucidum	Privet; tree	√	√	√	√	√	√	√	√	√	!	√	√	√	√	√	X
Ligustrum sinense	Privet; Chinese	√	√	√	√	√	√	√	√	√	!	√	√	√	√	√	X
Lonicera japonica (including cvs but not hybrids)	Japanese honeysuckle	!	√	√	√	√	√	X	√	√	X	X	√	!	√	√	X
Ludwigia peploides ssp. *montevidensis*	Water primrose	√	√	√	√	!	√	!	√	√	√	√	√	√	!	!	X
Lycium ferocissimum	Boxthorn	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X
Marsilea mutica	Nardoo/four-leaved water clover	√	√	√	√	√	√	!	!	√	√	√	√	√	√	√	X
Melianthus major	Cape honey flower	√	√	√	√	!	√	X	√	√	X	√	√	√	√	√	X
Menyanthes trifoliata	Bogbean	√	√	√	√	√	√	√	√	√	√	√	√	√	√	!	X
Myriophyllum aquaticum	Parrot's feather	√	√	√	√	√	√	√	!	√	√	√	√	√	√	√	X
Nephrolepis cordifolia	Tuber ladder fern	√	√	√	√	√	√	√	√	√	X	√	√	√	√	√	X
Nuphar lutea	Yellow water lily	√	!	√	√	√	√	X	√	√	!	√	√	√	√	√	X
Nymphoides geminata	Marshwort	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X
Nymphoides peltata	Fringed water lily	√	√	√	√	√	√	√	!	√	√	√	√	√	√	√	X
Oxylobium lanceolatum	Oxylobium	√	√	√	√	√	√	√	√	√	X	√	√	√	√	√	X
Passiflora caerulea	Blue passion flower	√	√	√	√	√	√	√	√	√	X	√	√	√	√	√	X
Passiflora mixta	Banana passionfruit	√	√	√	√	X	√	!	√	√	√	√	√	√	√	√	X
Passiflora mollissima	Banana passionfruit	√	√	√	√	√	√	√	!	√	√	√	√	√	√	√	X
Pennisetum alopecuroides	Chinese pennisetum	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X
Pennisetum macrourum	African feather grass	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Pennisetum setaceum	Fountain grass	√	X	√	√	X	√	√	√	√	√	√	√	√	√	√	X
Phragmites australis	Phragmites	√	√	!	√	√	√	√	!	√	√	√	√	√	√	√	X
Pinus contorta	Lodgepole pine	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X
Plectranthus ciliatus	Plectranthus	√	√	√	√	√	√	X	√	√	X	√	√	√	√	√	X

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Scientific name	Common name	Auckland	Bay of Plenty	Canterbury	Chatham Islands	Gisborne	Hawke's Bay	Manawatu-Wanganui	Marlborough	Northland	Otago	Southland	Taranaki	Tasman-Nelson	Waikato	Wellington	West Coast
Plectranthus ecklonii	Plectranthus	X	√	√	√	√	√	√	√	√	X	X	X	√	√	√	X
Plectranthus grandis	Plectranthus	X	√	√	√	√	√	X	√	√	X	√	√	√	√	√	X
Polygala myrtifolia (excluding cv "grandiflora")	Sweet pea shrub	√	√	√	√	√	√	!	√	√	√	√	√	√	√	√	X
Potamogeton perfoliatus	Clasped pondweed	√	√	√	√	√	√	√	√	√	X	√	√	√	√	!	X
Rhamnus alaternus	Italian/evergreen buckthorn	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X
Rosa rubiginosa	Sweet briar	√	√	√	√	√	√	√	!	√	√	√	√	√	√	√	X
Rubus fruticosus agg. (wild aggregates)	Blackberry	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Sagittaria graminea ssp. *platyphilla*	Sagittaria	√	√	√	√	!	√	!	√	√	√	!	!	√	√	√	√
Senecio angulatus	Cape ivy	√	√	√	√	√	√	!	√	√	√	√	√	√	√	√	X
Senecio jacobaea	Ragwort	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Senecio mikanioides	German ivy	√	√	√	√	√	√	√	√	√	X	√	√	√	√	√	X
Senecio petasitis	Velvet groundsel	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X
Setaria palmifolia	Palm grass	√	√	√	√	√	√	√	√	√	X	√	√	√	√	√	X
Silybum marianum	Variegated thistle	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X
Solanum carolinense	Horse nettle	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X
Solanum marginatum	White-edged nightshade	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Solanum mauritianum	Woolly nightshade	√	√	X	√	√	√	!	√	√	!	√	√	√	√	√	X
Spartina spp. and hybrids	Spartina	!	!	!	√	!	!	!	!	√	√	!	!	!	!	√	X
Stipa spp. (all spp. except natives)	Stipa	√	!	√	√	√	√	√	√	√	√	√	√	√	√	√	X
Teline monspessulana	Montpellier broom	!	!	√	√	√	!	!	!	!	√	!	!	!	!	!	√
Tussilago farfara	Coltsfoot	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Ulex spp.	Gorse	√	√	√	√	√	√	!	!	√	√	√	!	!	√	√	√
Urtica dioica	Perennial nettle	√	X	√	√	X	√	√	!	√	√	!	√	√	√	√	X
Utricularia gibba	Bladderwort	√	√	√	√	√	√	√	√	√	X	√	√	√	√	√	X
Vallisneria gigantea (Lake Pupuke variety)	Eelgrass	!	!	√	√	!	!	!	!	√	!	!	!	!	!	!	√
Vallisneria spiralis (Meola Creek, Lake Whiritoa & Wanganui varieties)	Eelgrass	!	!	!	√	!	!	!	!	√	!	!	!	X	!	!	√
Xanthium spinosum	Bathurst bur	√	√	√	√	!	√	!	√	√	√	√	!	√	√	√	X
Xanthium strumarium (occidentale)	Noogoora bur	√	√	√	√	√	√	!	√	√	√	√	√	√	√	√	X
Zizania latifolia	Manchurian wild rice	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	X

Key

√ Correctly specified in Regional Pest Management Strategy.

X Not specified in Regional Pest Management Strategy.

! Inaccurately specified, i.e. specification in Regional Pest Management Strategy differs from that on the National Generic List e.g. full scientific name not provided or misspelt, inclusion/exclusion of cultivars/subspecies/varieties/hybrids specified inaccurately.

4. Data Analysis

Table 2: Level of implementation of the National Generic List by Councils

Council name (abbrev.)	No. of items omitted from NGL	No. of items specified accurately*	No. of items specified inaccurately
Chatham Islands	0	111	0
Northland	0	110	1
Hawke's Bay	0	107	4
Waikato	0	106	5
Wellington	0	105	6
Tasman-Nelson	1	103	7
Marlborough	1	92	18
Auckland	2	104	5
Bay of Plenty	2	101	8
Canterbury	3	104	4
Gisborne	3	99	9
Southland	3	95	13
Taranaki	4	98	9
Manawatu-Wanganui	6	83	22
Otago	31	69	11
West Coast	92	19	0

* The total number of items on the NGL is 111.

All Councils have published their intention to include *some* form of the National Generic List in Regional Pest Management Strategy proposals or "final" documents, with the exceptions of the Chatham Islands Council (see 5.1) and the West Coast Regional Council (see 5.2). In most cases the lists used differ to the final version of the NGL.

The NGL contains 111 items. Of the 16 Councils, 14 include, or intend to include, 105 or more of the items in Regional Pest Management Strategies[14]. Of the two remaining Councils, Otago Regional Council includes 69 of the items in their strategy and the West Coast Regional Council includes 19 items in the *West Coast Regional Noxious Plants Program* (WCRC, 1993). Most Councils specified several items incorrectly e.g. failed to provide correct scientific names or failed to indicate whether cultivars/subspecies/varieties/hybrids are included or excluded.

5. Discussion

The broad acceptance of the approach of prohibiting the sale, propagation and distribution of pest plants is a very positive contribution to the protection and restoration of conservation values in New Zealand. Those Councils that have participated deserve much praise for choosing to implement this vital new method of controlling the human-assisted dispersal of pest plants throughout New Zealand. However, it is of great concern that several Councils have, for whatever reasons, modified the National Generic List and that two have not yet included it in a Regional Pest Management Strategy document.

5.1 Chatham Islands Council

The Chatham Islands Council has neither declared plants to be "noxious" nor produced a Regional Pest Management Strategy document. However, the Council intends to call for submissions on their intention to prohibit the sale, propagation and distribution of a list of plants prepared by Russell (1996c) (Terry Melville, pers. comm.). This list includes all items on the National Generic List plus numerous other plants considered by the Department of Conservation (DoC) to be capable of causing serious adverse effects on conservation values[15]. In Table 1. and Table 2. it is therefore indicated that the Council has correctly specified all plants on the NGL.

5.2 West Coast Regional Council

The West Coast Regional Council has not prepared a Regional Pest Plant Management Strategy document. At present, their *Noxious plants program* (WCRC, 1993) remains in force. The programme does not refer to any plants by their scientific names, but in Table 1. and Table 2. it has been assumed that the correct scientific names apply. A RPMS will "eventually" be produced and "should" include the types of control measures advocated in this report (Winston Beck, pers. comm.). A list of plants prepared by Russell (1996b) will be considered for inclusion in their RPMS. This list includes the NGL and numerous other plants considered by DoC to be capable of causing serious adverse effects on conservation values[16].

5.3 Otago Regional Council

The Otago Regional Council (ORC) has prohibited the sale, propagation and distribution of many pest plants. However, the Council has omitted many of the items that are on the National Generic List (see 10.1). Most of the omissions are of environmental weeds that have, in the past, been used for "ornamental" purposes. ORC also specify several items in a different manner to that in which they are specified on the NGL (see 10.2). This aberrant treatment of the NGL may have occurred as a result of pressure from plant merchants (see 10.3) and/or because the Council was not fully aware of the need to prohibit the sale etc. of the entire NGL (as specified on the NGL) on a nationwide basis (see 5.5).

5.4 All other Councils

All other Councils have included most or all items on the National Generic List in RPMS documents. While a few items were omitted by some Councils, many of these omissions are likely to have been accidental e.g. Auckland Regional Council included *Plectranthus ciliatus* but not *P. ecklonii* and *P. grandis*. Some items were also specified inaccurately e.g. Hawke's Bay and Waikato Regional Councils specified "*Spartina* spp" instead of "*Spartina* spp and hybrids". While these relatively minor errors should be rectified, they should not be seen to detract from the affirmative stance displayed by these Councils towards the "nationwide ban" concept.

Several Councils reported that, in hindsight, a difficulty with including the National Generic List in its entirety was the number of "preliminary" lists they received. Some claimed they had included what they understood to be a "final" list when in fact it was only a "preliminary" list. Some also copied lists from other's RPMSs on the assumption that they had used the "final" list in its entirety, when in fact they had not. Canterbury Regional Council (CRC) omitted several items in error and will include the full list in its final RPMS (Ray Maw, pers. comm.). CRC are also considering the inclusion of a further list of plants prepared by Russell (1996a) which

contains numerous plants considered by DoC to be capable of causing serious adverse effects on conservation values[17].

It is of some concern that a few "ornamental" plants were omitted by some Councils. The plants involved include *Acmena smithii*, *Buddleja davidii* (excluding hybrids), *Cotoneaster franchettii*, *Erigeron karvinskianus*, *Plectranthus ciliatus*, *P. ecklonii*, *P. grandis*, *Lonicera japonica* (including cvs but not hybrids), *Melianthus major* and *Solanum mauritianum* (refer to Table 1 for the Councils involved). Although some of these plants may also have been omitted in error, some may also have been omitted intentionally. This may have occurred as a result of pressure from plant merchants (see 5.7) or because the Councils concerned were not fully aware of the need to prohibit their sale, propagation and distribution on a nationwide basis (see 5.5).

5.5 Need for a **national** *ban on the sale, propagation and distribution of pest plants*

All plants on the National Generic List are undoubtedly pests *somewhere* in New Zealand. With climate warming, plant adaptation and the appearance of both sexes of dioecious species in areas where only one sex has existed, all plants on the NGL could in time become weeds in most or all regions. The NGL concept was for all regions to cooperate so that plants on the list could not be sold, propagated or distributed in one region and disperse (naturally or with human assistance) to other regions. The northern regions adopted "southern" weeds, the southern regions were expected to reciprocate.

The NGL was compiled through consultation with botanists, ecologists, conservationists, the Nursery and Garden Industry Association and other parties throughout the country. In the process, several serious environmental weeds (e.g. *Tradescantia fluminensis*, *Selaginella kraussiana* and *Jasminum polyanthum*) were reluctantly removed from the list in order to gain approval of the remaining species by the NGIA. All of the remaining plants were agreed to by the NGIA as being a weed. The NGIA stipulated that they wanted a single list so every plant merchant in the country would know what they could sell, propagate and distribute throughout New Zealand - the mail-order and plant shipping business is a significant part of the trade and is growing every year (Jack Craw, pers. comm.). All regions were expected to adopt the NGL in full so that, in effect, a national strategy would be established that prohibited the sale, propagation and distribution of *one* list of plants throughout the entire country (i.e. a generic list for all Councils to adopt).

It would be absurd for some regions to continue selling plants that are prohibited in other regions. New Zealand is a small country. The sale, propagation or distribution of pest plants anywhere in New Zealand can only exacerbate their dispersal[18]. Plants and their propagules travel more than a few kilometres from "the shop door" once they are sold. New Zealand's most popular leisure activity is gardening. The informal distribution of plants between gardeners is a significant means of weed dispersal. Prohibiting the sale, propagation and distribution of the National Generic List *throughout* New Zealand is an essential component of mitigating their spread and establishment in the wild, regardless of exactly where this might occur (other tactics are also necessary e.g. raising public awareness).

As an example of the approach a few Councils appear to have taken, the Otago Regional Council states in its RPMS (section 2.2) that they have amended the NGL "... to reflect local conditions and circumstances without compromising the purpose of a consistent approach throughout New Zealand". However, as explained in this report, omitting plants from the NGL *does* compromise the purpose of a consistent approach throughout New Zealand. With many of the omitted plants

clearly presenting a threat to the Otago region itself (see 10.1), their omission also compromises the purpose of prohibiting their sale in *Otago*.

In their strategy (section 9.4), ORC wisely state that they wish to prevent "... the importation of the pest plants in Schedule 1 [the amended version of the National Generic List] into Otago". Achieving this would be significantly easier if all other Councils, especially those neighbouring Otago, prohibited the sale etc. of the plants in question - and it is likely that they will do so. ORC apparently failed to consider a reciprocal arrangement because the plants they omitted from the NGL could be *legally* sold and propagated in Otago and then disperse to other regions (naturally and/or with human assistance) where their sale etc. is prohibited.

Many species that were dropped from the NGL are now being added by Councils, along with other serious environmental weeds such as those considered by DoC to be capable of causing serious adverse effects on conservation values (e.g. *Tradescantia fluminensis*, *Selaginella kraussiana*, *Jasminum polyanthum*). These Councils, which include most of those in the northern half of the North Island, are now faced with other regions where their sale etc. may continue. This implies that any plant declared to be a pest in any region should be banned from sale, propagation and distribution nationally. This would indeed be a sensible policy.

5.6 The "climatic distributional limitation" assumption

Some parties claim that climatic factors have, to date, prevented certain plants from becoming weedy in particular areas. This assumption, that climatic factors will strictly limit the distribution of naturalised plants, is usually unfounded. For example, in their RPMS (section 1.1) Otago Regional Council claim that "... the region's isolation and climate has meant many plants causing concern in northern parts of New Zealand do not pose the same problems for Otago". However, many of the plants omitted from their strategy have already become weedy in Otago (see 10.1). Additionally, there is no evidence that those plants that are not *currently* known to be weedy in Otago will not become so in future. One reason why a precautionary approach should be taken towards the sale etc. of plants that are weedy in other parts of the country is that this alone indicates potential for weediness in other regions.

Many plants have become weedy in northern New Zealand before becoming so further south (Newfield, 1996). Early in their colonisation it may have been assumed that these plants would not become weedy in southern regions. It is likely that many plants will *first* become weedy in northern areas because they are a more common point of entry for foreign plants, have larger human populations and have a warmer climate. The combination of these factors in northern areas allows foreign plants to become naturalised *sooner* than they might in southern New Zealand. Assumptions that a plant will not become weedy "further south" because it has not yet done so are flawed. Given sufficient opportunity to "seek out" suitable areas for establishment, or with climate warming, many so-called "northern weeds" will become "southern weeds" too.

Merchants are not likely to wish to sell plants in a region unless they could be expected to survive there. If weedy in northern areas, even small climatic changes could allow such plants to become weedy further south (such predictions have been made regarding the possible distribution of native plants with climate change). Southern Regions should make the most of experiences in northern NZ and reduce the risks posed to their regions (and others) by pest plants by prohibiting their sale, propagation and distribution (along with other measures e.g. raising public awareness).

5.7 Pressure from plant merchants

It is perhaps no coincidence that many of the plants omitted from the National Generic List by some Councils have recently been sold by plant merchants. Their weedy qualities make them easy to propagate and care for and must have provided a good financial return for the minimal resources invested in them. Merchants put *some* amount of pressure on Councils for them to allow them to continue selling some of the plants on the NGL (see 10.3). The merchants concerned were presumably unaware of, or complacent about the current or potential weediness of these plants in New Zealand. It can only be concluded that these matters were not well researched by the Councils concerned or that they share the merchants' complacency and amended the NGL accordingly.

5.8 Inaccurate specifications

Most Councils inaccurately specified several of the items on the National Generic List i.e. their specification differs from that on the NGL (e.g. full scientific name not provided or misspelt, inclusion/exclusion of cultivars/subspecies/varieties/hybrids inaccurately specified). Such inaccuracies *may* be of little significance, but could perhaps lead to unnecessary conflict with plant merchants or problems with enforcement.

6. Two common arguments *against* prohibiting the sale, propagation and distribution of pest plants

In the author's experience, two main arguments arise against the concept of prohibiting the sale etc. of pest plants (presented below). These arguments are regularly used by merchants who seem complacent about the serious adverse effects environmental weeds are capable of causing on conservation values. The arguments are discussed here to provide interested parties, particularly Council staff, with a more appropriate perspective.

6.1 "Plant "x" shouldn't be banned in a region where it has not yet become a serious weed, because it may not become weedy there"

As discussed in 5.5 and 5.6, most plants on the National Generic List could become weedy in most or all regions sometime in the future. Plants and their propagules travel more than just a few kilometres from "the shop door". Prohibiting the sale etc. of environmental weeds will reduce the likelihood of their spreading to other regions. Allowing plants to become weedy in a region to prove that they can do so, defeats the purposes of prohibiting their sale etc. (e.g. enhancing the effectiveness of control operations, preventing their establishment in uninfested areas).

6.2 "There is no point in banning the sale etc. of plant "x" because it is already established in the region," or "there is no point closing the door after the horse has bolted".

There is much to be gained from banning the sale etc. of serious weeds, even widespread ones. Although many serious weeds are widespread throughout New Zealand there are still large areas where they have not become established (e.g. *Clematis vitalba* and *Ulex europaeus* - both of which have been sold in New Zealand in the past). The probability of establishment of such

weeds in new areas is very dependent on the proximity of parent plants, the number of propagules "released" and the number of "releases" (Norton, 1995)[19]. In other words, the closer the "release", the more propagules involved and the more releases there are, the more likely it is that a weed will reach areas not currently occupied by it. Prohibiting the sale etc. of such weeds reduces the likelihood of their reaching uninfested areas.

Additionally, a great deal of effort is put into weed control with much success e.g. the eradication of 4km^2 of *Hedychium gardnerianum* in Whangaroa Harbour by the Whangaroa Ginger Group (Winch, 1996). The additional "release" of propagules of such plants by merchants reduces the feasibility and effectiveness of control operations. If it was legal to do so, would merchants sell *Clematis vitalba* or *Ulex europaeus* today, on the basis that they are widespread?

7. Amending Regional Pest Management Strategies

Any Regional Pest Management Strategy can be amended at any time by way of a review (*Biosecurity Act 1993*; section 88). Some Councils may have been planning to allow their Strategies to run for the maximum five year term before reviewing them.

8. Acknowledgments

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10. Appendices

10.1 Items on National Generic List omitted by Otago Regional Council

Scientific name	Common name	Comments*
Acmena smithii	White monkey apple	
Ageratina riparia (Eupatorium riparium)	Mistflower	
Anredera cordifolia	Mignonette/Madeira vine	Naturalised in Canterbury.
Araujia sericifera	Moth plant	
Asparagus asparagoides	Smilax	Naturalised in Canterbury.
Bartlettina sordida	Bartlettina sordida	
Calluna vulgaris (excluding double-flowered cultivars)	Heather	Naturalised in Canterbury and Southland. Most/all cultivars recently available are double-flowered and are apparently unable to produce seed. These were not intended to be prohibited from sale etc..
Cobaea scandens	Cathedral bells	Naturalised in Westland and Canterbury.
Cortaderia jubata	Purple pampas	Thrive in Otago and likely to become weedier where both sexes occur together (Carol West, pers. comm.).
Cortaderia selloana	Pampas grass	Thrive in Otago and likely to become weedier where both sexes occur together (Carol West, pers. comm.).
Cotoneaster franchettii	Cotoneaster	Naturalised in Westland, Canterbury, Otago and Southland. Specified by DoC Otago as a pest plant (Simpson, 1995).
Cotoneaster glaucophyllus	Cotoneaster	Naturalised in Westland and Canterbury. Specified by DoC Otago as a pest plant (Simpson, 1995).
Dipogon lignosus	Mile-a-minute	
Erigeron karvinskianus	Mexican daisy	Naturalised in Westland, Canterbury and Otago.
Galega officinalis	Goats rue	
Galeobdolon luteum	Artillery plant/ aluminium plant	Naturalised in Westland and Canterbury.
Hedychium flavescens	Ginger; yellow	*Hedychium gardnerianum* (kahili ginger) is specified by O.R.C. so perhaps *H. flavescens* was omitted in error because it was not realised that there are *two* weedy species.
Ipomoea indica	Blue morning glory	
Lantana camara var. *aculeata*	Lantana	Varieties other than *aculeata* are cultivated and are currently thought to be less weedy than this variety (Jack Craw, pers. comm.). They are not intended to be prohibited from sale etc..
Lonicera japonica (including cultivars but not hybrids)	Japanese honeysuckle	Naturalised throughout South Island. Cultivars contribute to wild populations of the species.
Melianthus major	Cape honey flower	Naturalised throughout the South Island.
Nephrolepis cordifolia	Tuber ladder fern	
Oxylobium lanceolatum	Oxylobium	
Passiflora caerulea	Blue passion flower	Naturalised in Otago.
Plectranthus ciliatus	Plectranthus	Naturalised in Westland.
Plectranthus ecklonii	Plectranthus	
Plectranthus grandis	Plectranthus	
Potamogeton perfoliatus	Clasped pondweed	
Senecio mikanioides	German ivy	Naturalised throughout South Island.
Setaria palmifolia	Palm grass	
Utricularia gibba	Bladderwort	

* Unless otherwise stated, comments on distribution are sourced from Healy & Edgar (1980) (for monocotyledons) and Webb *et al.* (1988) (for pteridophytes and dicotyledons).

10.2 Items on National Generic List specified inaccurately by Otago Regional Council

Scientific name (National Generic List specification)	**Common name**	**Otago Regional Council specification**	**Comments***
Crataegus monogyna	Hawthorn	*"Crataegus monogyna* (Not included for root stock purposes)"	Naturalised throughout South Island. Use as root stock requires propagation and may also result in growth of *C. monogyna* through suckering, as occurs with *Solanum mauritianum* and *Passiflora caerulea* rootstocks (Jack Craw, pers. comm.).
Cyperus rotundus	Nutgrass/purple nutsedge	*"Cyperus rotundas"*	Misspelt.
Cytisus scoparius	Broom	*"Cytisus scoparius* (Excluding Ornamental Varieties)"	Naturalised throughout South Island. Specified as a pest plant by DoC Otago (Simpson, 1995). Cultivars are likely to be capable of producing viable seed and/or revert to wild form (Carol West, pers. comm.). Cultivars of other broom species are available.
Erica lusitanica (excluding double-flowered cultivars)	Spanish heath	*"Erica lusitanica"*	Naturalised throughout South Island. Specified by DoC Otago as a pest plant (Simpson, 1995). Most/all cultivars recently available are double-flowered and are apparently unable to produce seed (Jack Craw, pers comm.). These were not intended to be prohibited from sale etc. and this should be stated in the strategy.
Iris pseudacorus	Yellow flag	*"Iris pseuducorus"*	Misspelt. Naturalised in Canterbury and Southland.
Ligustrum lucidum	Privet; tree	*"Ligustrum lucidium* (Not included for root stock purposes)"	Misspelt. Naturalised in Canterbury (pers. obs.). Use as root stock requires propagation and may also result in growth of *L. lucidum* through suckering, as occurs with *Solanum mauritianum* and *Passiflora caerulea* rootstocks (Jack Craw, pers. comm.).
Ligustrum sinense	Privet; Chinese	*"Ligustrum sinense* (Not included for root stock purposes)"	Use as root stock requires propagation and may also result in growth of *L.sinense* through suckering, as occurs with *Solanum mauritianum* and *Passiflora caerulea* rootstocks (Jack Craw, pers. comm.).
Nuphar lutea	Yellow water lily	*"Nupha lutea"*	Misspelt.
Vallisneria gigantea (Lake Pupuke variety)	Eelgrass	*"Vallisneria spp.* (Lake Pupuke Meola Creek varieties)"	Incorrectly specified.
Vallisneria spiralis (Meola Creek, Lake Whiritoa & Wanganui varieties)	Eelgrass	*"Vallisneria spp.* (Lake Pupuke Meola Creek varieties)"	Incorrectly specified.

* Unless otherwise stated, comments on distribution are sourced from Healy & Edgar (1980) (for monocotyledons) and Webb *et al.* (1988) (for dicotyledons).

10.3 "Blacklisting of plants opposed," **Otago Daily Times, 29 February 1996**

Blacklisting of plants opposed

By Fleur Howe

Otago plant growers are objecting to the Otago Regional Council blacklisting some popular garden plants, including Scottish heather and honeysuckle.

At a submissions hearing yesterday on the council's proposed pest plant management strategy, two Otago nurserymen told the council Scottish heather and honeysuckle were not pest plants and banning them would hit nurseries in the district.

Mark Brown, from Blueskin Nurseries, Waitati, supplies about 50 retail shops between Christchurch and Invercargill. In an interview after the hearings he said he would have to throw away about 10% of his trade if the list was not altered.

Denis Hughes, of Blue Mountain Nurseries, Tapanui, sells thousands of the plants annually and said he knew of three local growers who were trying to grow Scottish heather for export.

He had been growing some of these plants for nearly half a century and had not seen any evidence of them needing to be banned.

The nurserymen, who spoke on behalf of the New Zealand Nursery and Garden Industry Association (NGIA), objected to the council banning Scottish heather (*Calluna vulgaris*), honeysuckle (*Lonicera japonica*), pampas grass (*Cortadaria selloana*), blue passion flower (*Passiflora caerula*) and wild sweet pea (*Polygala myrtifolia*) from being sold or propagated.

A national list of pest plants was prepared by the Northland Regional Council in consultation with nursery representatives about 18 months ago. Revised lists have been in the process of being adopted by regional councils around the country over the past six months.

NGIA national secretary John Mawson said when the national list was composed, there had been compromises on each side.

Because of varying regional climates it was up to each regional council to make its own decision on the final list, he said.

At the hearings yesterday, council senior noxious plants officer Steve Hix said there had been consultation at national level but noted there was also a need for local consultation.

Council policy manger Tony Avery said final decisions would be released in April.

11. Notes

[1] Plants that are capable of causing, at some time, a serious adverse effect on "the viability of rare or endangered species of organisms, the survival and distribution of indigenous plants or animals or the sustainability of natural and developed ecosystems, ecological processes and biological diversity," hereafter referred to as "conservation values." A variety of attempts have been made to define the adverse effects environmental weeds are capable of causing on conservations values e.g. Clunie (1995), Harding (1994; 1995), Porteous (1993), Simpson (1995).

[2] For example, as ornamental plants.

[3] Another contributing factor is likely to have been the ease with which such plants can be propagated and cared for.

[4] Refer to Note 1.

[5] Theoretically, *C. vitalba* could have been sold legally in those parts of various regions where it had *not* been declared noxious (John Randall, pers. comm.). Nationwide publicity is likely to have significantly curbed the deliberate sale etc. of *C. vitalba,* but more than one case has recently arisen where it was unwittingly being sold. There is currently no requirement for plant merchants to accurately identify the plants they merchandise.

[6] Plants that are capable of causing, at some time, a serious adverse effect on one or more of the following:

(i) economic well-being, or

(ii) the viability of rare or endangered species of plants or animals, the survival and distribution of indigenous plants or animals or the sustainability of natural and developed ecosystems, ecological processes and biological diversity, or

(iii) soil resources or water quality, or

(iv) human health or enjoyment of the recreational value of the natural environment, or

(v) the relationship of Maori and their culture and traditions with their ancestral lands, waters, sites, waahi tapu and taonga.

Although the definition of the term "pest" in the Biosecurity Act 1993 is "... an organism specified as a pest in a Pest Management Strategy," it remains an appropriate term for organisms that are capable of causing serious adverse effects on one or more of the above, regardless of whether or not the organisms in question are included in any Pest Management Strategy. The term will continue to be used in this sense (e.g. by the general public and the Department of Conservation), and it is in this sense that the term is used in this report.

[7] This list was approved by the Nursery and Garden Industry Association (NGIA) for inclusion in all Regional Pest Plant Management Strategies for the purpose of prohibiting the sale, propagation and distribution of all plants on the list, nationwide (under sections 52 and 53 of the Biosecurity Act 1993). The implementation date for the NGL has been agreed to by NGIA and the Biosecurity Technical Advisory Group to be 1 July 1997.

[8] In this report, the term "Councils" refers to all Regional Councils, the Chatham Islands Council and all Unitary Authorities (the latter includes some, but not all, City and District Councils). The Councils involved are identified in Table 1 (p4) and Table 2 (p7).

[9] An arm of the Regional Affairs Committee of the Local Government Association, often referred to as "B-TAG".

[10] For example, it does not include *Tradescantia fluminensis, Selaginella kraussiana* or *Jasminum polyanthum* (all included in the Forest Friendly Award scheme) because the Nursery and Garden Industry Association did not agree to their inclusion.

[11] Refer to Note 7.

[12] Scientific names should be referred to as the definitive specification because they are considerably more reliable than common names in terms of accurately specifying the plants in question.

[13] Alternative common names may exist or may be shared by other species, etc.. Most are therefore unreliable in terms of accurately specifying the plants in question.

[14] Three Councils are waiting for the *Biosecurity Amendment Bill no. 4* to be passed before producing a "final" Strategy; Bay of Plenty Regional Council (Drew Cumming, pers. comm.), Canterbury Regional Council (Ray Maw, pers. comm.) and Gisborne District Council (Phil Karaitiana, pers. comm.). Information regarding these Councils is therefore sourced from their Regional Pest Management Strategy *proposals*. All other Councils have produced "final" Regional Pest Management Strategies (at least for plants; although most/all have not yet been *adopted*), except for the Chatham Islands Council (see 5.1) and the West Coast Regional Council (see 5.2).

[15] Several Department of Conservation Conservancies have identified *some* of the environmental weeds that are of particular concern in their areas e.g. Clunie (1995), Harding (1994; 1995), Simpson (1995). Relevant data from these and other documents was considered and passed on to several Councils by the author. Unfortunately, there is no document regarding environmental weeds throughout the entire country, otherwise such data would have been passed on to each Council. The most comprehensive document currently available may be the *Weeds in New Zealand Protected Natural Areas Database* (Timmins and Mackenzie, 1995). The database is a "live" document (i.e. it will be continually updated with new plants and information pertaining to them) and the original edition only contained a small number of plants. It appears that this document will only deal with plants that occur in protected natural areas (PNAs) at the time and not those which occur outside PNAs and have the potential to invade them.