

DEPARTMENT OF CONSERVATION TECHNICAL SERIES No. 8

***WEEDS IN NEW ZEALAND
PROTECTED NATURAL AREAS
DATABASE***

Compiled By

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WEEDS IN NEW ZEALAND PROTECTED NATURAL AREAS DATABASE

Compiled by
Susan M. Timmins and Ian W. Mackenzie
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ABSTRACT

The Weeds in New Zealand Protected Natural Areas Database brings together information on the ecology and control of environmental weeds, which is being prepared for electronic availability. So far, information has been collated for 67 species, predominately problem weeds.

The contents of the weeds database at 1 November 1994 is presented in printed form to provide the information in a concise and accessible format. Each species entry consists of three data sheets: the Taxon Sheet details basic ecology; the Impacts and Management Sheet describes the impact of the weed on native communities and methods used for its control; and the Chemical Control Sheet records the results of chemical control attempts both from rigorous trials and from management operations.

The species coverage will be extended to include all species currently being controlled by DOC, and eventually, all other potential problem weeds. Further information concerning those species already included, is welcomed.

1. INTRODUCTION

The management of weeds in New Zealand protected natural areas is hampered by a lack of information. There are large gaps in our knowledge and much of the available pertinent information is inaccessible to most managers. It is not systematically recorded or stored and it is widely dispersed in the literature, among various agencies, and many Department of Conservation (DOC) staff. Williams and Timmins (1990) recommended that DOC establish a database to bring together the scattered gems of knowledge and experience into a consistent and accessible format. The information could then be made available to those who need it for sound management of weeds in protected natural areas.

This report represents the first stage of establishment of such a database. It was compiled by soliciting information from staff in DOC, Ministry of Agriculture and Fisheries, Forest Research Institute, DSIR (now Landcare Research Ltd), regional authorities, universities, and other "experts".

1.1 Components of the database

The database consists of three data sheets per species. The Taxon Sheet details the basic ecology of the weed species; the sort of information that would be found in scientific reviews such as the biological flora series in either *Journal of Ecology* or *Journal of Australian Institute of Agricultural Research*.

The **Impacts and Management Sheet** focuses on the impact of a weed species on native communities, and includes methods that have been used to curtail these effects. It is similar to recent summaries of weeds in natural areas, e.g. Macdonald and Jarman (1984).

The third, **Chemical Control Sheet**, records the details of a variety of control efforts from formal, controlled trials to less rigorous, trial-and-error control operations.

The initial emphasis has been on collating information for the 65 species identified by Williams and Timmins (1990) as problem weeds in protected natural areas. So far information has been collated for 57 of these species plus a further 10 other weed species of conservation concern (Table 1). Most of the information has been provided by individuals very familiar with the ecology and/or control of particular species. Some additional information has been gleaned from published sources. Some of the entries are more complete than others. For some species there are only sketchy details on control.

1.2 Weed legislation

During the course of compiling this database the legislation covering weeds has changed. The Noxious Plants Act 1978, under which weeds were classified as noxious A, B, target, widespread, or special programme, was repealed and replaced with the Biosecurity Act 1993. Species classified as noxious under the former Act are covered by the transitional provisions of the Biosecurity Act, Section 181. These provisions will remain in force at a particular place until a pest management strategy is developed for the species there, or otherwise until they

expire on 30 June 1996. Of course, many of the species which are weeds in reserves were not declared noxious. For some, pest management strategies will be developed. Others may continue to have no legal weed status.

1.3 Future of the database

It is hoped that the publication of the database to date may stimulate those with knowledge to complete the information for the remaining problem weeds (Table 2), other weed species of more local concern (Table 3) and potential problem weeds (Table 4). Blank input forms have been included at the end of the report (Appendix 1). These may be photocopied and filled out for new entries or with additional information for the database.

Ultimately, it would be useful to record the details of all weed control efforts. In this way each attempt at weed control would become an experiment, albeit often with limited rigour, from which others could profit. Such information would be most useful for new weeds or novel methods but even the results of unsuccessful control attempts can be helpful to others.

At present the data are stored electronically on the Science and Research Division server and may be accessed there via a simple search program. The database will be updated as records come to hand. The current version of the database may be interrogated at any time by contacting Science and Research Division. It is also intended to make the database available as a national, networked database in Oracle. Hardcopy updates will probably also be needed on a regular basis, for distribution to every conservancy and field centre.

Any feedback on the database: information that should be included, additions to the Potential Problem Weeds list, improvements to the layout, suggestions for the mechanism of information transfer or bouquets, are welcome. Further information for inclusion in the database will be gratefully received.

Send to:

Weeds Database,
Science and Research Division,
Department of Conservation,
Box 10-420, Wellington.

2. ACKNOWLEDGEMENTS

Thank you to the long list of people from many agencies who contributed the information in the database. The name of the main contributor for each species is given at the end of each data sheet. The original input data forms were designed by Peter Williams, Landcare Research, Susan Timmins and Euan Nicol, Science and Research Division, DOC and Rae Munro-Darby, Estate Protection Policy Division, DOC. This design was refined by Maia Fergusson who input much of the original data set and wrote the database manipulation program. Ross Pickard improved the data manipulation program; Joanne Horner did several iterations of data entry and correction. Ian Mackenzie designed the layout of this volume, and prepared the text for publication.

3. REFERENCES CITED

Macdonld, I.A.W.; Jarman, M.L. (Eds) 1984: Invasion of alien organisms in the terrestrial ecosystems of the fynbos biome, South Africa. Council for Scientific and Industrial Research, Pretoria. *South African National Scientific Programmes Report 85*.

Williams, P.A.; Timmins, S.M.1990: Weeds in New Zealand protected natural areas: A review for the Department of Conservation. *Science and Research Series No. 14*. Department of Conservation, Wellington.

4. CURRENT CONTENTS

The list in Table 1 gives the formal plant name followed by its common name, for all species currently on the database, at 1 November 1994. The species are organised alphabetically by formal name.

TABLE 1 Weed species included in this database.

Formal name	Common name
<i>Acer pseudoplatanus</i>	sycamore
<i>Ageratina adenophora</i>	Mexican devil
<i>Ageratina riparia</i>	mist flower
<i>Agrostis capillaris</i>	browntop
<i>Alternanthera philoxeroides</i>	alligator weed
<i>Ammophila arenaria</i>	marram grass
<i>Araujia sericifera</i>	moth plant
<i>Asparagus scandens</i>	climbing asparagus
<i>Berberis darwinii</i>	barberry, Darwin's
<i>Buddleja davidii</i>	buddleia
<i>Calluna vulgaris</i>	heather
<i>Chrysanthemoides monilifera</i>	bone-seed
<i>Clematis vitalba</i>	old man's beard
<i>Cortaderia jubata</i>	purple pampas grass
<i>Cortaderia selloana</i>	pampas grass
<i>Crataegus monogyna</i>	hawthorn
<i>Cytisus scoparius</i>	broom
<i>Dactylis glomerata</i>	cocksfoot
<i>Egeria densa</i>	oxygen weed
<i>Ehrharta erecta</i>	veld grass
<i>Elaeagnus x reflexa</i>	elaeagnus
<i>Erica lusitanica</i>	Spanish heath
<i>Gymnocoronis spilanthoides</i>	Senegal tea
<i>Hakea gibbosa</i>	downy hakea
<i>Hakea salicifolia</i>	willow-leaved hakea
<i>Hakea sericea</i>	prickly hakea
<i>Hedera helix</i> subsp. <i>helix</i>	ivy
<i>Hedychium flavescens</i>	wild ginger (yellow)
<i>Hedychium gardnerianum</i>	wild ginger (kahili)
<i>Hieracium pilosella</i>	mouse-ear hawkweed
<i>Hieracium praealtum</i>	king devil
<i>Hydrilla verticillata</i>	hydrilla
<i>Hydrodictyon reticulatum</i>	water net

Formal name	Common name
<i>Iris foetidissima</i>	stinking iris
<i>Lagarosiphon major</i>	lagarosiphon
<i>Larix decidua</i>	European larch
<i>Leycesteria formosa</i>	Himalayan
<i>Ligustrum lucidum</i>	honeysuckle
<i>Ligustrum sinense</i>	tree privet
<i>Lonicera japonica</i>	Chinese privet
<i>Lupinus polyphyllus</i>	Japanese honeysuckle
<i>Lycium ferocissimum</i>	Russell lupin boxthorn
<i>Myriophyllum aquaticum</i>	parrot's feather
<i>Nassella trichotoma</i>	nassella tussock
<i>Passiflora mollissima</i>	banana passionfruit
<i>Pennisetum clandestinum</i>	kikuyu grass
<i>Pinus contorta</i>	lodgepole pine
<i>Pinus nigra</i>	Corsican pine
<i>Pinus pinaster</i>	maritime pine
<i>Pinus radiata</i>	radiata pine
<i>Pseudotsuga menziesii</i>	Douglas fir
<i>Racosperma dealbatum</i>	silver wattle
<i>Rhamnus alaternus</i>	evergreen buckthorn
<i>Rosa rubiginosa</i>	sweet briar
<i>Rubus fruticosus</i> agg.	blackberry
<i>Salix fragilis</i>	crack willow
<i>Sambucus nigra</i>	elder
<i>Selaginella kraussiana</i>	selaginella
<i>Senecio mikanioides</i>	German ivy
<i>Solanum mauritianum</i>	woolly nightshade
<i>Spartina alterniflora</i>	American spartina
<i>Spartina anglica</i>	spartina
<i>Tradescantia flumensis</i>	wandering Jew
<i>Ulex europaeus</i>	gorse
<i>Zizania latifolia</i>	Manchurian wild rice

5. FUTURE ENTRIES

5.1 Recognised problem weeds

Table 2 lists weed species on the Williams and Timmins (1990) list of 65 problem weeds in New Zealand protected natural areas, which are not yet included in the weed database (at 1 November 1994).

TABLE 2 Problem weeds omitted

Formal name	Common name
<i>Asparagus asparagoides</i>	smilax
<i>Berberis glaucocarpa</i>	barberry
<i>Juncus spp.</i>	rush
<i>Lotus pedunculatus</i>	lotus
<i>Lupinus arboreus</i>	tree lupin
<i>Robinia pseudacacia</i>	robinia
<i>Salix cinerea</i>	grey willow
<i>Vinca major</i>	periwinkle

5.2 Controlled weeds

Weed species subject to some control on at least one site on the conservation estate, but not yet included in the database are listed in Table 3.

TABLE 3 Controlled weeds omitted

Formal name	Common name
<i>Acmena smithii</i>	monkey apple
<i>Alnus glutinosa</i>	alder
<i>Anredera cordifolia</i>	madeira vine
<i>Aristea ecklonii</i>	aristea
<i>Arrhenatherum elatius</i>	tall oat grass
<i>Arundo donax</i>	giant reed
<i>Asparagus asparagoides</i>	smilax
<i>Berberis glaucocarpa</i>	barberry
<i>Caesalpina decapetala</i>	Mysore thorn
<i>Carduus nutans</i>	nodding thistle
<i>Carex longibrachiata</i>	Australian sedge
<i>Celastrus orbiculatus</i>	climbing spindle berry
<i>Cestrum aurantiacum</i>	orange cestrum
<i>Cirsium spp.</i>	Thistle
<i>Cobaea scandens</i>	cathedral bells
<i>Convolvulus arvensis</i>	field bindweed

Formal name	Common name
<i>Cotoneaster glaucophyllus</i>	cotoneaster
<i>Cotoneaster simonsii</i>	Khasia berry
<i>Crocasmia x crocosmiiflora</i>	montbretia
<i>Dipogon lignosus</i>	mile-a-minute
<i>Echium vulgare</i>	viper's bugloss
<i>Ehrharta villosa</i>	pyp grass
<i>Equisetum arvense</i>	horsetail
<i>Erigeron karvinskianus</i>	Mexican daisy
<i>Eriobotrya japonica</i>	loquat
<i>Euonymus europaeus</i>	spindle berry
<i>Euonymus japonicus</i>	Japanese spindle berry
<i>Festuca arundinacea</i>	tall fescue
<i>Glyceria fluitans</i>	floating sweet grass
<i>Humulus lupulus</i>	hop
<i>Hypericum androsaemum</i>	tutsan
<i>Ipomoea indica</i>	blue morning glory
<i>Jasminum humile</i>	yellow jasmine
<i>Jasminumpolyanthum</i>	jasmine
<i>Juglans ailantifolia</i>	Japanese walnut
<i>Juncus acutus</i>	sharp rush
<i>Juncus articulatus</i>	jointed rush
<i>Juncus bulbosus</i>	bulbous rush
<i>Lantana camara</i> var. <i>aculeata</i>	lantana
<i>Lolium perenne</i>	perennial rye grass
<i>Lotus pedunculatus</i>	lotus
<i>Lupinus arboreus</i>	tree lupin
<i>Melianthus major</i>	Cape honey flower
<i>Mimulus guttatus</i>	monkey musk
<i>Nephrolepis cordifolia</i>	tuber sword fern
<i>Osmunda regalis</i>	royal fern
<i>Osmunda lanceolatum</i>	oxylobium
<i>Pandorea pandorana</i>	wonga wonga vine
<i>Paraserianthes lophantha</i>	brush wattle
<i>Paspalum distichum</i>	Mercer grass
<i>Passiflora edulis</i>	black passionfruit
<i>Passiflora mixta</i>	northern banana passionfruit
<i>Pennisetum macrourum</i>	African feather grass
<i>Phytolacca octandra</i>	inkweed

Formal name	Common name
<i>Polygala myrtifolia</i>	sweet pea bush
<i>Populus</i> spp.	poplar
<i>Prunus avium</i>	sweet cherry
<i>Psoralea pinnata</i>	dally pine
<i>Racosperma dealbatum</i>	silver wattle
<i>Racosperma longifolium</i>	Sydney golden wattle
<i>Racosperma paradoxum</i>	kangaroo acacia
<i>Rumex sagittatus</i>	climbing dock
<i>Salix cinerea</i>	grey willow
<i>Sedum acre</i>	stonecrop
<i>Senecio angulatus</i>	Cape ivy
<i>Senecio jacobaea</i>	ragwort
<i>Senna septemtrionalis</i>	buttercup bush
<i>Solanum jasminoides</i>	potato vine
<i>Solanum linnaeanum</i>	Apple of Sodom
<i>Sorbus aucuparia</i>	rowan
<i>Syzygium australe</i>	brush cherry
<i>Tropaeolum speciosum</i>	Chilean flame creeper
<i>Tussilago farfara</i>	coltsfoot
<i>Vaccinium corymbosum</i>	highbush blueberry
<i>Vinca major</i>	periwinkle
<i>Watsonia bulbifera</i>	watsonia

5.3 Potential problem weeds

Some species are not yet a major problem on the conservation estate. Their potential for being troublesome in the future is just being recognised. They have not yet been included in the weed database, but are listed in Table 4. This is obviously a list which will be expanded in the future.

TABLE 4 Potential problem weeds omitted from the database.

Formal name	Common name
<i>Clematis flammula</i>	---
<i>Impatiens glandulifera</i>	Himalayan balsam
<i>Juncus squarrosus</i>	heath rush
<i>Pennisetum setaceum</i>	African fountain grass
<i>Pueraria lobata</i>	kudzu
<i>Pyrostegia</i> spp	flame vine
<i>Setaria palmifolia</i>	palm grass
<i>Stipa tenacissima</i>	esparto grass?

6. WEEDS DATABASE ENTRIES

In this report the entries are arranged alphabetically by genus and species name. An index on page 277 lists entries by both common name and formal name. Details are as recorded in the database, at 1 November 1994.

Acer pseudoplatanus sycamore

TAXON SHEET

1. **Common name:** sycamore
Family: Aceraceae
Formal name: *Acer pseudoplatanus*
Synonym: none
 2. **Growth form:** tall tree (20 m)
 3. **Distribution:**
[abundance rating = low (l), medium (m), high (h) for present/potential infestation]

Northern (l/l)
Waikato (l/m)
Eastern (l/l)
Wanganui (m/m)
Nelson/Marlborough (m/h)
West Coast (l/l)
Canterbury (m/h)
Southland (l/m)
 4. **Habitat:** coastal, lowland
 5. **Communities:** low forest, scrub and forest margins, shrubland
 6. **Fertility:** high
 7. **Response to environment:**

Response to
drought only moderately tolerant
shade highly tolerant
frost fairly resistant, especially as it is deciduous
poor drainage slightly tolerant

physical damage can resprout as seedlings and from stumps
grazing deer and cattle graze its foliage, but it resprouts
fire (plants, seeds) no information
other
- Seedling requirements and tolerances
soil phosphorus availability (Britain)
- Growth rates
seedlings rapid, but slow in shaded conditions
adults rapid, but slow in shaded conditions

8. Growth and reproduction:

Breeding system

flowering type monoecious, flowers produce nectar
method of pollination insect, bee
other comments

Life cycle

type perennial, mesophanerophyte with bud covering
flowering time early spring
fruiting time late summer - early autumn
other comments

Deciduous/evergreen deciduous

Age of reproduction

sexual (10) 30-40 years
asexual

Life span (years) may live to 400 years, but none that old in New Zealand

Seed

production yes, annually, in bunches up to 40, totalling >10,000/tree
dispersal gravity, wind (100 m or more)
viability no information in NZ; in Britain, germination % high under normal sowing conditions
germination germinates in spring in New Zealand
seed bank transient

Vegetative reproduction

none

Comments

grows in wide range of open forest and scrub types with moderately high light levels

9. Browsers and parasites:

deer, cattle, aphids

10. General facilitation:

11. Contributors and Date of last revision:

Rowan Buxton, Landcare Research, Lincoln, November 1993
Peter Williams, Landcare Research, Nelson, October 1993

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** sycamore
Formal name: *Acer pseudoplatanus*
2. **Illustration:** Keble Martin, W. 1975: The concise British flora in colour. Ebury Press, London. plate 20.
Porteous, T. 1993: Native forest restoration. QEII National Trust. Wellington.
3. **Impact on biota and ecosystem**
large
Plant -plant relationships
shading excluding native species
Plant -animal relationships
unknown but does not produce fruit or nectar so an inferior habitat for native birds and other animals (insects, lizards)
Ecosystem
unknown but species is deciduous
Other
unknown
4. **Management:**
Hand control
seedlings pulled in early autumn gives visible results
Mechanical
ringbarking gives moderate success; felling, resprouts often
Chemical control
Tordon injected into trunk through drilled holes; 1% Roundup sprayed after flowering
Combination
fell trees, paint stumps with 1:20 Tordon in water, good success; or cover stumps with black polythene; paint stumps with 20% Roundup: apply undiluted Roundup (1.5 mL per cut) to frill or inject
Biological control
none
Other
5. **Legislation:** none
6. **References:** Jones, E.W. 1944: Biological flora of the British Isles: *Acer* L. *Ecology* 32: 215-252.
Linhart, Y.B., Whelan, R.J. 1980: Woodland regeneration in relation to grazing and fencing in Coed Gorswen, North Wales. *Journal of Applied Ecology* 17: 827-840.
Binggeli, P. 1992: Patterns of invasion of sycamore in relation to species and ecosystems attributes. D. Phil. Thesis, The University of Ulster.
7. **Other sources of information and current projects:**
Buxton, R.P. Ecology of sycamore (*Acer pseudoplatanus*) populations at Peel Forest Park, South Canterbury, New Zealand (submitted to *NZ Journal of Ecology*).
8. **Contributors and Date of last revision:**
Rowan Buxton, Landcare Research, Lincoln, November 1993
Peter Williams, Landcare Research, Nelson, October 1993
Porteous, T. 1993 (see above)

Ageratina adenophora Mexican devil

TAXON SHEET

1. **Common name:** Mexican devil
Family: Asteraceae
Formal name: *Ageratina adenophora*
Synonym: *Eupatorium adenophorum*
2. **Growth form:** herb, subshrub
3. **Distribution:**
[abundance rating = low (l), medium (m), high (h) for present/potential infestation]
North Island, Auckland and Coromandel northwards (l-m/l-m)
4. **Habitat:** coastal, lowland
5. **Communities:** scrub and forest margin, shrubland, track margins, stream sides
6. **Fertility:** low-moderate
7. **Response to environment:**

Response to

drought	tolerant
shade	intolerant
frost	intolerant
poor drainage	intolerant?

physical damage
grazing
fire (plants, seeds)
other

Seedling requirements and tolerances

open sites

Growth rates

seedlings	fast
adults	

8. Growth and reproduction:

Breeding system

flowering type
method of pollination insect?
other comments

Life cycle

type perennial
flowering time August - December - (March) (from Flora IV)
fruiting time late Summer -Autumn?
other comments

Deciduous/evergreen evergreen

Age of reproduction

sexual 1 year?
asexual

Life span (years) a few years

Seed

production yes
dispersal wind, water, possibly fruiting heads attach to vertebrates, and probably road mowers
viability
germination
seed bank

Vegetative reproduction

Comments

9. Browsers and parasites:

a trypetid stem gall fly was introduced in 1958 (*NZ J Science* 3: 200-208) as a biological control agent; most plants seen have been attacked by this parasite

10. General facilitation: by seed, wind borne

11. Contributors and Date of last revision:

Ewen Cameron, Auckland Institute and Museum, December 1990
Northland Conservancy, DOC, Weed Control Manual [no date]

IMPACTS AND MANAGEMENT SHEET

- 1. Common name:** Mexican devil
Formal name: *Ageratina adenophora*
- 2. Illustration:** Upritchard, E.A. comp. 1985: A guide to the identification of New Zealand common weeds in colour. NZ Weed and Pest Control Society, Hastings.
- 3. Impact on biota and ecosystem**
small

Plant -plant relationships

competes for open ground, but large infestations of this species not seen; may impair regeneration of native plant seedlings

Plant -animal relationships

poisonous

Ecosystem

capacity to invade a large range of plant communities with moderate to high light intensity

Other

- 4. Management:**

Hand control dig out small infestations

Mechanical

Chemical control Escort (5 g + 10 mLs Pulse/10L water), handgun, knapsack, mistblower; Roundup (1% + 0.2% Pulse); control when plant is in flower but before sets seed

Combination

Biological control trypetid stem gall fly

Other

weaken population growth by slashing or light spraying allowing native vegetation to take over and shade out Mexican devil

- 5. Legislation:** declined noxious status
- 6. References:** biological control: Hoy, J.M. 1960: Establishment of *Procecidochares utilis* stone (Diptera: Trypetidae) on *Eupatorium adenophorum* Spreng. in New Zealand. *NZ Journal Science* 3: 200-208.
- 7. Other sources of information and current projects:**
- 8. Contributors and Date of last revision:**
Ewen Cameron, Auckland Institute and Museum, December 1990
Northland Conservancy, DOC, Weed Control Manual [no date]

Agertina riparia
mist flower

TAXON SHEET

1. **Common name:** mist flower
Family: Asteraceae
Formal name: *Ageratina riparia*
Synonym: *Eupatorium riparium*
2. **Growth form:** herb, subshrub
3. **Distribution:** Common in North Auckland, local in South Auckland, Lower Hutt, Wellington City
4. **Habitat:** coastal, lowland
5. **Communities:** forest margin, damp banks and stream sides, slips
6. **Fertility:**
7. **Response to environment:**

Response to

drought

shade intolerant

frost

poor drainage

physical damage

grazing

fire (plants, seeds)

other

Seedling requirements and tolerances

Growth rates

seedlings

adults

8. Growth and reproduction:

Breeding system

flowering type
method of pollination
other comments

Life cycle

type
flowering time August - January - (March)
fruiting time
other comments

Deciduous/evergreen evergreen

Age of reproduction

sexual
asexual

Life span (years)

Seed

production yes
dispersal wind, water, road mowing machines
viability
germination
seed bank

Vegetative reproduction

Comments

9. Browsers and parasites:

a trypetid stem gall fly was introduced in 1958 (*NZ J Science* 3: 200-208) as a biological control agent; most plants seen have been attacked by this parasite

10. General facilitation:

typical dispersal routes are streams and roadsides as well as forest light gap to forest light gap; disturbance caused by flooding of streams opens up habitats and distributes seed

11. Contributors and Date of last revision:

SMT, December 1993, compiled from: Flora of New Zealand vol. IV; Northland Conservancy, DOC, Weed Control Manual [no date]

IMPACTS AND MANAGEMENT SHEET

- 1. Common name:** mist flower
Formal name: *Ageratina riparia*
- 2. Illustration:**
- 3. Impact on biota and ecosystem**
can smother plants <1 m tall with dense, persistent mats of semi-woody stems, prevents regeneration

Plant -plant relationships

Plant -animal relationships

poisonous

Ecosystem

causes more rapid build up of sediment on alluvial flats, provides less stability to steep land gullies than native cover

Other

4. Management:

Hand control

dig out small infestations

Mechanical

Chemical control

Escort 20 gm/100 L water + 0.1% Pulse, handgun, winter; Roundup 1% + 0.1% + 0.2% Pulse, handgun, winter; Roundup 1% + 0.2% Pulse, handgun or knapsack, avoid spraying during summer dormancy.

Combination

Biological control

Other

work from upstream first, initial control in autumn, follow up when in flower (July -August)

5. Legislation:

6. References:

Rai, J.P.N., Tripathi, R.S. 1984: Allelopathic effects of *Eupatorium riparium* on population regulation of two species of *Galinsoga* and soil microbes. *Plant and Soil* 80: 105-117.
Yadav, A.S., Tripathi, R.S. 1982: A study on the seed population dynamics of three weedy species of *Eupatorium*. *Weed Research* 22: 69-76.

7. Other sources of information and current projects:

8. Contributors and Date of last revision:

SMT, December 1993, compiled from: Flora of New Zealand vol. IV; Northland Conservancy, DOC, Weed Control Manual [no date]

Agrostis capillaris brown top

TAXON SHEET

1. **Common name:** brown top
Family: Poaceae
Formal name: *Agrostis capillaris* L.
Synonym: *Agrostis tenuis*
2. **Growth form:** grass
3. **Distribution:**
[abundance rating = low (l), medium (m), high (h) for present/potential infestation]
4. **Habitat:** coastal, lowland, montane, subalpine
5. **Communities:** scrub and forest margin, tall tussockland, short tussockland, herbfield, fernland, sand dune, riverbed
6. **Fertility:** low; can grow well in high fertility, but normally outcompeted; able to grow on very poor soils
7. **Response to environment:**

Response to

drought	tolerant
shade	slightly tolerant
frost	tolerant
poor drainage	slightly tolerant
physical damage	resprout
grazing	resprout
fire (plants, seeds)	survives and resprouts after cool fires
other	

Seedling requirements and tolerances

Growth rates

seedlings	
adults	rate of c. 0.1 m day ⁻¹ in high light, good fertility and water

8. Growth and reproduction:

Breeding system

flowering type one-flowered spikelets, hermaphrodite
method of pollination wind
other comments predominantly outcrossing; tetraploid

Life cycle

type vegetatively spreading perennial
flowering time late December - end January
fruiting time mid - late April
other comments

Deciduous/evergreen evergreen

Age of reproduction

sexual ? 1-2 years; will flower as soon as photoperiod appropriate (short day plant)
asexual few days

Life span (years) >3 in wild, infinite in cultivation

Seed

production yes
dispersal wind, water, humans, vertebrates
viability c. 80%
germination 5-99% (various records)
seed bank probably none, seed probably breaks down

Vegetative reproduction

yes, tiller

Comments

9. Browsers and parasites:

orange rust

10. General facilitation:

11. Contributors and Date of last revision:

Bill Lee, Landcare Research, Dunedin, March 1991
Jill Rapson, Ecology Department, Massey University, Palmerston North,
March 1994

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** brown top
Formal name: *Agrostis capillaris* L.
2. **Illustration:** Lambrechtsen, N.C. 1975: What grass is that? DSIR Information Series 87, Wellington.
3. **Impact on biota and ecosystem**
 - Plant -plant relationships
sward forming so competitive with low stature species
 - Plant -animal relationships
 - Ecosystem invasive in short, highly fertile alpine vegetation
 - Other
4. **Management:**
 - Hand control
 - Mechanical
 - Chemical control
 - Combination
 - Biological control
 - Other increasing fertility normally results in its exclusion by taller species
5. **Legislation:**
6. **References:**
 - Rapson, G.L. 1985: Vegetative Strategy in *Agrostis capillaris* L. PhD thesis, University of Otago.
 - Rapson, G.L., Wilson, J.B. 1988: Non-adaption in *Agrostis capillaris* L (Poaceae). *Functional Ecology* 2: 479-490.
 - Rapson, G.L. *NZ Journal Botany* 30: 1-24 (2 papers).
7. **Other sources of information and current projects:**
8. **Contributors and Date of last revision:**
 - Bill Lee, Landcare Research, Dunedin, March 1991
 - Jill Rapson, Ecology Department, Massey University, Palmerston North, March 1994

Alternanthera philoxeroides
alligator weed

TAXON SHEET

1. **Common name:** alligator weed
Family: Amaranthaceae
Formal name: *Alternanthera philoxeroides* (Mart.) Griseb.
Synonym:

2. **Growth form:** herb

3. **Distribution:**
[abundance rating = low (l), medium (m), high (h) for present/potential infestation]

Northland & Auckland Regions (m/h)
Waikato (l/h)
Other NZ lowlands (absent/m-h)

4. **Habitat:** coastal, lowland

5. **Communities:** sand dune, riverbed, wetland, other

6. **Fertility:** moderate, high

7. **Response to environment:**

Response to
drought tolerant
shade tolerant
frost slightly tolerant
poor drainage highly tolerant

physical damage resprout
grazing resprout
fire (plants, seeds)
other

- Seedling requirements and tolerances
n/a

- Growth rates
seedlings very rapid vegetative growth
adults very rapid vegetative growth

8. Growth and reproduction:

Breeding system

flowering type
method of pollination
other comments

Life cycle

type vegetative in New Zealand
flowering time
fruiting time
other comments

Deciduous/evergreen evergreen

Age of reproduction

sexual
asexual

Life span (years)

Seed

production no
dispersal
viability
germination
seed bank

Vegetative reproduction

fragmentation

Comments

9. Browsers and parasites:

biocontrol agents, few generalist insects noted

10. General facilitation:

mechanical drain diggers, other contaminated machinery, water spreads
floating mats, vegetative spread

11. Contributors and Date of last revision:

Paul Champion, NIWA, Hamilton, August 1992

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** alligator weed
Formal name: *Alternanthera philoxeroides* (Mart.) Griseb.
2. **Illustration:** IFAS, Centre for Aquatic Plants, University of Florida.
3. **Impact on biota and ecosystem**
 - Plant -plant relationships
smothers all herbaceous marginal or submerged vegetation in small, enclosed water bodies
 - Plant -animal relationships
few grazing species; possible loss of inanga spawning sites in estuarine situations
 - Ecosystem
decreases plant diversity
 - Other
4. **Management:**
 - Hand control
possible where very low level of infestation
 - Mechanical
probably responsible for much of the spread of this species
 - Chemical control
metsulfuron (Escort) 15 g/100L or dichlobenil (Prefix-D) granules 100 kg/ha: promising trial results; diquat (Reglone): good initial knockdown but total regrowth within 6 months; glyphosate (Roundup): poor results
 - Combination
possible integration of biological agents with diquat or metsulfuron
 - Biological control
Agascicles and Vogtia, introduced agents, both promising in frost-free aquatic situations, not on land
 - Other
5. **Legislation:** class B noxious plant in Northland & Auckland; target status in Waikato
6. **References:** Bowmer *et al.* 1991: Australian Water Research Advisory Council. Roberts, L.I.N.; Sutherland, O.R.W. 1989: *Alternanthera philoxeroides* (C. Martius) Grisebach, alligator weed (Amaranthaceae). Pp 325-330 in Cameron, P.J.; Hill, R.L.; Bain, J.; Thomas, W.P. (Eds.): A review of biological control of insect pests and weeds in New Zealand 1874 to 1987. Technical communication, CAB Institute of Biological Control 10, CAB International, Wallingford, UK.
7. **Other sources of information and current projects:**
Aquatic Plant Section, NIWA. Chris Winks, Landcare, Mt Albert. 2 thesis topics presently investigating aspects of biocontrol, Auckland University
8. **Contributors and Date of last revision:**
Paul Champion, NIWA, Hamilton, August 1992

Ammophila arenaria
marram grass

TAXON SHEET

1. **Common name:** marram grass
Family: Poaceae (Gramineae)
Formal name: *Ammophila arenaria*
Synonym:
2. **Growth form:** herb, grass
3. **Distribution:** throughout and abundant everywhere on coastal dunes; still some potential for spread on the remaining areas
4. **Habitat:** coastal
5. **Communities:** sand dune
6. **Fertility:** low
7. **Response to environment:**

Response to

drought	highly tolerant
shade	intolerant
frost	unknown
poor drainage	intolerant
physical damage	resprout from rhizomes
grazing	virtually unpalatable
fire (plants, seeds)	resprout from rhizomes
other	burial by sand, resprout from rhizomes

Seedling requirements and tolerances

seedlings require moist sand

Growth rates

seedlings	slow
adults	vigorous growth in mobile sand but become moribund when sand is stable

8. Growth and reproduction:

Breeding system

flowering type

method of pollination wind

other comments

Life cycle

type

perennial

flowering time

November -March

fruiting time

unknown

other comments

Deciduous/evergreen evergreen

Age of reproduction

sexual

unknown

asexual

unknown

Life span (years)

virtually limitless in right conditions

Seed

production

yes, appears to be low

dispersal

wind

viability

apparently low

germination

winter

seed bank

nil

Vegetative reproduction

extensive growth by rhizomes allows rapid spread

Comments

9. Browsers and parasites:

unknown

10. General facilitation:

moves by trapping sand and growing through it

11. Contributors and Date of last revision:

T.R. Partridge, Landcare Research, Christchurch, January 1991

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** marram grass
Formal name: *Ammophila arenaria*
2. **Illustration:** Wilson, Hugh 1982: Stewart Island plants. Field guide publications. Christchurch, p.412.
3. **Impact on biota and ecosystem**
 - Plant -plant relationships
displaces pingao (*Desmoschoenus spiralis*) in many areas; may sometimes displace *Spinifex sericeus*
 - Plant -animal relationships
unknown
 - Ecosystem
builds high dunes rapidly and stabilises sand
 - Other
4. **Management:**
 - Hand control
pulling is fairly ineffectual
 - Mechanical
 - Chemical control
see Chemical Control Sheet
 - Combination
 - Biological control
 - Other
5. **Legislation:** planting encouraged by Sand Act (1906) for its value in sand stabilisation
6. **References:** Esler, A.E. 1974: Vegetation of the sand country bordering the Waitakere Range, Auckland: the southern beaches. *Proceedings of the New Zealand Ecological Society* 21: 72-77. Hurskes, A.H.L. 1979: Biological flora of the British Isles- *Ammophila arenaria*. *Journal of Ecology* 67: 363-382. Sykes, M.T. 1986: The native sand dune vegetation of southern New Zealand. PhD thesis, University of Otago.
7. **Other sources of information and current projects:**
current DOC/Landcare project on the interaction of marram and pingao
8. **Contributors and Date of last revision:**
T.R. Partridge, Landcare Research, Christchurch, January 1991

CHEMICAL CONTROL SHEET

Weed species common name: marram grass

User & Location	Chemical	Application Rate	Method of Application	Season of Application	Periodicity	Success Rating
Harry Keys, Desert Road, Tongariro/Taupo Conservancy	Galant	75 mls in 10L water + 100mls crop oil	Knapsack	March (summer- autumn)	Annual	50% kill with first spraying, follow up necessary
		150 mls/ 10L water/ 100 mls crop oil	Knapsack	March (summer- autumn)	Annual	60-80% kill
		300 mls/ 10L water/ 100 mls crop oil	Knapsack	March (summer- autumn)	Annual	80-90% kill, recommended application rate; follow up indigenous grasses also affected to some extent

Araujia sericifera moth plant

TAXON SHEET

1. **Common name:** moth plant
Family: Asclepiadaceae
Formal name: *Araujia sericifera*
Synonym: *Physianthus albens*
2. **Growth form:** climber
3. **Distribution:** Auckland
Blenheim
4. **Habitat:** coastal, lowland
5. **Communities:** cliff, bluff, waste places and other modified habitats
6. **Fertility:**
7. **Response to environment:**

Response to

drought
shade
frost
poor drainage

physical damage
grazing
fire (plants, seeds)
other

Seedling requirements and tolerances

Growth rates

seedlings
adults

8. Growth and reproduction:

Breeding system

flowering type

method of pollination self-fertile

other comments

Life cycle

type

flowering time December -May

fruiting time autumn

other comments

Deciduous/evergreen

Age of reproduction

sexual

asexual

Life span (years)

Seed

production yes, freely set seed, 400 per follicle

dispersal wind

viability at least 5 years

germination

seed bank

Vegetative reproduction

Comments

9. Browsers and parasites:

10. General facilitation: originally a garden plant

11. Contributors and Date of last revision:

SMT, December 1993, compiled from: North Shore City Council
Noxious Plants Information Sheet; Flora of New Zealand volume IV

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** moth plant
Formal name: *Araujia sericifera*
2. **Illustration:** Flora of New Zealand volume IV (flower only)
Porteous, T. 1993: Native forest restoration. QEII National Trust, Wellington.
3. **Impact on biota and ecosystem**
 - Plant -plant relationships
suppresses supporting plants
 - Plant -animal relationships
sap may cause skin irritation; suspected of causing animal poisoning
 - Ecosystem
 - Other
4. **Management:**
 - Hand control
 - Mechanical
 - Chemical control cut off plants close to the ground, grub out roots and treat with herbicide e.g. Banvine 12 mls per 1 L of water or Yates woody weedkiller; trace back vines 15 cm above ground level and cut, treat cut ends with herbicide e.g. Banvine 100 mls/1L water or Yates woody weedkiller 120 mls per 100 mls water.
 - Combination
 - Biological control
 - Other
5. **Legislation:** none
6. **References:**
7. **Other sources of information and current projects:**
8. **Contributors and Date of last revision:**
SMT, December 1993, compiled from: North Shore City Council Noxious Plants Information Sheet; Flora of New Zealand volume IV; Porteous, T. 1993 (see above)

Asparagus scandens climbing asparagus

TAXON SHEET

1. **Common name:** climbing asparagus
Family: Liliaceae
Formal name: *Asparagus scandens*
Synonym:
 2. **Growth form:** climber
 3. **Distribution:**
[abundance rating = low (l), medium (m), high (h) for present/potential infestation]

Northern (m/h)
Auckland (m/h)
inner Hauraki Gulf Islands (m/h)
Wanganui (m/m)
 4. **Habitat:** coastal, lowland
 5. **Communities:** scrub and forest margin, secondary forest
 6. **Fertility:** moderate
 7. **Response to environment:**

Response to
drought tolerant
shade tolerant
frost intolerant?
poor drainage slightly tolerant?

physical damage resprouts from tubers
grazing
fire (plants, seeds)
other
- Seedling requirements and tolerances
shade tolerant
- Growth rates
seedlings fast growing
adults fast growing

8. Growth and reproduction:

Breeding system

flowering type hermaphrodite
method of pollination insect?
other comments tubers

Life cycle

type slender perennial
flowering time May, October, November
fruiting time January, May, August
other comments

Deciduous/evergreen evergreen

Age of reproduction

sexual
asexual

Life span (years)

Seed

production yes
dispersal birds
viability
germination
seed bank

Vegetative reproduction

Comments

9. Browsers and parasites:

10. General facilitation:

source of infestation originally from household plants; seed spread by bird

11. Contributors and Date of last revision:

Ewen Cameron, Auckland Institute & Museum, December 1990
Colin C. Ogle, DOC Wanganui, June 1992

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** climbing asparagus
Formal name: *Asparagus scandens*
2. **Illustration:** North Shore City noxious plants information sheet
Porteous, T. 1993: Native forest restoration. QEII National Trust, Wellington.
3. **Impact on biota and ecosystem**
Large

Plant -plant relationships

Low scrambler, smothers forest understorey to a height of 2.5-5m particularly in secondary forest, prevents regeneration of canopy species; ring-barks by strangulation

Plant -animal relationships

fleshy fruit eaten by birds

Ecosystem

can invade forest interior and unmodified forest

Other

4. **Management:**

Hand control

can be done for small amounts but it is easy to leave tubers in ground if you don't loosen plants before pulling them (CCO); difficult to remove because rhizomes can travel up to 50 cm from parent plant; compost or bury in landfill

Mechanical

Chemical control

must be done with care because climbing asparagus leaves often intertwined with those of native host thus spray herbicide to only lightly wet the lower portions of the plant; 1% glyphosate (Roundup, Nufarm), plus 0.1% Pulse; within 30-60 days spot spray any missed

Combination

Biological control

Other

5. **Legislation:** none
6. **References:**
7. **Other sources of information and current projects:**
8. **Contributors and Date of last revision:**
Ewen Cameron, Auckland Institute & Museum, December 1990
Colin C. Ogle, DOC Wanganui, June 1992
additional information: North Shore City Noxious Plants Information Sheet, January 1991
Northland Conservancy DOC Weed Control Manual [no date]

Berberis darwinii
Darwin's barberry

TAXON SHEET

1. **Common name:** Darwin's barberry
Family: Berberidaceae
Formal name: *Berberis darwinii*
Synonym:
2. **Growth form:** shrub, small tree
3. **Distribution:**
[abundance rating = low (l), medium (m), high (h) for present/potential infestation]

Wellington to Paekakariki (m/?)
Wairarapa (m/?)
Central Canterbury - Foveaux Strait (m/m)
Stewart Island (l/m)
Manapouri - Te Anau (m/m)
Waverley (m/m)

4. **Habitat:** lowland
5. **Communities:** low forest, scrub and forest margin, shrubland
6. **Fertility:** low-moderate
7. **Response to environment:**

Response to

drought	highly tolerant
shade	highly tolerant, can invade tall woody native vegetation
frost	highly tolerant
poor drainage	slightly tolerant

physical damage	resprout from all parts
grazing	resprout from branches and crown
fire (plants, seeds)	
other	

Seedling requirements and tolerances

requires low competition from grasses, some shade, tolerates high shade

Growth rates

seedlings	grow 10-30 cm in first year
adults	plants can grow 30 cm - 2 m per year after first year

8. Growth and reproduction:

Breeding system

flowering type hermaphrodite
method of pollination insect (and bird); very popular with honey bees
other comments silvereyes and bellbirds take nectar

Life cycle

type perennial
flowering time July-February, most in November/December
fruiting time November -February
other comments some flowers and fruit all year round

Deciduous/evergreen evergreen

Age of reproduction

sexual 3 years?
asexual anytime

Life span (years) under 40 years

Seed

production yes, c.15,000/m² ground projection
dispersal vertebrates
viability 94%, none survive first season
germination September
seed bank none

Vegetative reproduction

regenerates from root suckers, layers, and crown

Comments

9. Browsers and parasites:

low incidence of foliage browse by feral goats; lower and fruit predation by goats and native moth larvae (4 species) relatively inconsequential

10. General facilitation:

use as garden plant; berries taken voraciously by silvereyes, blackbirds, thrushes, bees and by kereru

11. Contributors and Date of last revision:

R.B. Allen, Landcare Research, Dunedin, January 1991

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** Darwin's barberry
Formal name: *Berberis darwinii*
2. **Illustration:** Wilson, Hugh. 1982: Stewart Island Plants. Field Guide Publications, Christchurch, 1974

3. **Impact on biota and ecosystem**

Plant -plant relationships

establishes in regenerating or mature forest, often epiphytically, competes with shrub and small trees, scrambles up through canopy, can form most of the understorey as impenetrable thickets

Plant -animal relationships

valuable source of nectar for birds and insects, berries avidly consumed by birds; few predators, production insignificant

Ecosystem

4. **Management:**

Hand control

resprouts from cut bases; grubbing successful

Mechanical

bulldozing, root-raking can be effective

Chemical control

Roundup 20 ml/10 L and Pulse (recommended rate) sprayed in late summer (January -April) from knapsack kills 90% of young plants; 2 years spraying required for older plants; spray Escort at 35 g per 100 L

Combination

new growth from cut bases can be treated as above with success; apply 20% Roundup, or 20% Tordon brushkiller mixed with diesel or 20% Grazon mixed with diesel to cut stump; use 20% Roundup for filling or injection

Biological control

none

5. **Legislation:** class B widespread noxious plant in most regions

6. **References:** Allen, R.B. 1989: Fruiting in Darwin's barberry, a shrub recently naturalised in NZ. DSIR Botany Division Report.
Allen, R.B., Wilson, J.B. 1992: Fruit and seed production in *Berberis darwinii* Hook, a shrub recently naturalised in New Zealand. *NZ Journal Botany* 30(1): 45-66.
Meeklah, F.A., Mitchell, R.B. 1985: Control of barberry by "spot-gun" application method. *Proceedings, 38th New Zealand Weed and Pest Control Conference*: 78-80.

7. **Other sources of information and current projects:**

8. **Contributors and Date of last revision:**

R.B. Allen, Landcare Research, Dunedin, January 1991

additional information: Porteous, T. 1993. Native forest restoration. QEII National Trust, Wellington.

Buddleja davidii
buddleia

TAXON SHEET

1. **Common name:** buddleia
Family: Buddlejaceae
Formal name: *Buddleja davidii*
Synonym:
2. **Growth form:** shrub
3. **Distribution:**
[abundance rating = low (l), medium (m), high (h) for present/potential infestation]

Bay of Plenty (m/h)

Inland Wanganui-Mangaweka-Taihape-Taumarunui (m/h)

4. **Habitat:** lowland
5. **Communities:** scrub and forest margin, cliff, bluff, riverbed
6. **Fertility:** low-moderate
7. **Response to environment:**

Response to

drought	highly tolerant
shade	intolerant
frost	slightly tolerant?
poor drainage	slightly tolerant

physical damage	vigorous regrowth from cut stumps
grazing	? resprouts from stems, branches
fire (plants, seeds)	unknown
other	refoliates after some chemical defoliant

Seedling requirements and tolerances

requires high light conditions

Growth rates

seedlings	rapid height (0.5 m/year) and diameter (1 cm/year) growth in seedlings
adults	slower height (but not diameter) growth in adults

8. Growth and reproduction:

Breeding system

flowering type ? hermaphrodite
method of pollination insects
other comments

Life cycle

type perennial
flowering time
fruiting time
other comments

Deciduous/evergreen evergreen

Age of reproduction

sexual greater than 1 year
asexual ? greater than 1 year

Life span (years) 30 years where ousted by competitors, potentially longer

Seed

production yes, vast
dispersal wind, water
viability initially high, probably drops rapidly
germination apparently in spring following seedfall; profuse
seed bank probably none to speak of

Vegetative reproduction

regenerates from suckers

Comments

9. Browsers and parasites:

very limited browsing by vertebrates; insects associated with *Buddleja davidii* in New Zealand are non-specific and have no impact on plant vigour

10. General facilitation: seed dispersed by wind and water, and in road metal

11. Contributors and Date of last revision:

M.C. Smale, Landcare Research, Rotorua, December 1990
N.A. Forest Research Institute, Rotorua, January 1991
M. Kay, Forest Research Institute, Rotorua, January 1991

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** Buddleia
Formal name: *Buddleja davidii*
2. **Illustration:** What's New in Forest Research no. 185
Porteous, T. 1993: Native forest restoration. QEII National Trust, Wellington.
3. **Impact on biota and ecosystem**
Plant -plant relationships
ousts early successional species (grasses, herbs, shrubs) in riverbed successions and allows early entry of later successional species

Plant -animal relationships
food (nectar) source for some insects in late summer; impedes access for humans

Ecosystem
usurps early successional communities on riverbeds, but allows early entry of later successional species
4. **Management:**
Hand control pulling effective for young plants if in patches
Mechanical slashing ineffective
Chemical control see Chemical Control Sheet
Combination ? good control but not cost effective
Biological control currently under investigation; two promising agents in culture
Other
5. **Legislation:** none
6. **References:** Smale, M.C. 1990: Ecological role of buddleia in streambeds in Te Urewera N.P. *NZ Journal of Ecology* 14: 1-6.
7. **Other sources of information and current projects:**
Kay, M. and Smale, M.C. 1990: The potential for biological control of *Buddleja davidii* in New Zealand. FRI Bulletin Vol. 155. Joint FRI/industry 3 year biocontrol assessment underway.
8. **Contributors and Date of last revision:**
M.C. Smale, Landcare Research, Rotorua, December 1990
N.A. Davenhill, Forest Research Institute, Rotorua, January
M. Kay, Forest Research Institute, Rotorua, January 1991

CHEMICAL CONTROL SHEET

Weed species common name: buddleia

User & Location	Chemical	Application Rate	Method of Application	Season of Application	Periodicity	Success Rating
FRI bulletin Vol: 100	Roundup +5% diesel +0.01% emulsifier	5% solution	Small-medium droplets			
	Grazon +paraquat	1% +2.6%	Small-medium droplets			
	Grazon + Roundup	5% +3%	Small-medium droplets			
	Roundup +Tordon Brush killer NF	5% +3%	Small-medium droplets			
	Roundup Roundup	9 L/200 L/ha 0.75%	Aerial Brushgun	Oct-Feb		
	Roundup Roundup	1.0% 1.5%	Brushgun Knapsack	Mar-Sept		
	Escort Escort	5 g/10 L 35 g/100 L	Knapsack Knapsack			
	Escort Velpar 90	10 g/10 L 60 g/10 L	Mistblower Knapsack			

Calluna vulgaris heather

TAXON SHEET

1. **Common name:** heather
Family: Ericaceae
Formal name: *Calluna vulgaris* (L)
Synonym:
2. **Growth form:** shrub
3. **Distribution:**

Taupo to Southland (l-h abundance); largest infestation (h-m) in central North Island, centre in Tongariro National Park, but present in about 50,000 ha from Opepe Bush, west and east Taupo, Lakes Rotoaira-Otamangakau Basin, Tongariro State Forest, Kaimanawa Forest Park, Moawhango Ecological Region, Rangipo Blocks and south into Manganui-a-te-ao River; also present on Waikaremoana-Murupara Road, Ohura-Ahititi Road, Egmont and Cook National Parks, the Wilderness Reserve near Mossburn and Ben Callum in the Hokonui Hills near Dipton (see also 10)
4. **Habitat:** montane, subalpine, alpine
5. **Communities:** scrub and forest margin, shrubland, tall tussockland, short tussockland, herbfield, riverbed, wetland, alpine gravel field, dune slack, road edges
6. **Fertility:** low, low-moderate, moderate
7. **Response to environment:**

Response to

drought	slightly tolerant (intolerant in shallow soils in Europe)
shade	intolerant?
frost	highly tolerant
poor drainage	tolerant
physical damage	resprout
grazing	resprout
fire (plants, seeds)	resprout, new seedlings
other	

Seedling requirements and tolerances

need moisture, slightly increased soil fertility, some light; apparently less tolerant of frost than mature plants in Europe

Growth rates

seedlings	3mm per day after germination in lab, down to about 0.1 mm per day after one to two months
adults	pioneer stage: three to six years in Europe but only two years in Tongariro National Park; flowering after one year; basal branches equal leading shoot after two years in Europe. building stage: about 15 years in Europe, establishing maximum cover and density, but only 3-5 years in Tongariro National Park, maximum height 1-1.5 mature stage: starts to open up after about 25 years in Europe but in Tongariro National Park from 6-8 years old; puts on a lot of woody growth at this stage. degenerate stage: die out of central frame by 12-20 years in Tongariro National Park, but dead plants rare. Many plants in Mangatapopo Valley have ring ages older than 20 years, some are older than 30 years.

8. Growth and reproduction:

Breeding system perfect (male and female in each flower)
flowering type protandrous (male and female parts of flower mature at different times)
method of pollination wind and insects (bees, thrips)
other comments a pollinating agent is necessary, because fertilization never occurs in flowers which are experimentally enclosed; produces nectar; possibly self incompatible (CCO)

Life cycle

type see growth rates for adults under 7; typical angiosperm
flowering time flowering time summer and autumn; buds first appear early to mid-January
fruiting time late March?-April, but seeds shed into June or later

Deciduous/evergreen evergreen

Age of reproduction

sexual greater than or equal to one year
asexual mature stage, perhaps 6-8 years in New Zealand

Life span (years) 12-20 years in New Zealand (25+ in Europe)

Seed

production yes, one robust plant could produce 160,000 seeds per year; Norwegian calculation gave one million seed per m² per season
dispersal gravity, wind; dispersal calculated at 100m in winds of 10 m/s (19 knots) and 250 m in 30-40 m/s
viability ≥ 11-12 years in soil but evidence for some viability up to 45 years
germination 8-14 days under suitable conditions; 96% after two months
seed bank very large, in the order of 10,000 in Scottish studies

Vegetative reproduction

after disturbance vegetative regrowth from remaining parts of plant; also adventitious rooting from larger branches of older plants; much of spread is by vegetative reproduction

Comments

reproduction is mostly by seed in youngest and oldest plants; in building and mature stages, both seed and vegetative reproduction occur, with vegetative regrowth being more vigorous and effective than seeding

9. Browsers and parasites:

rabbits, cattle, sheep, deer and insect browsers (heather beetle *Lochmaea sutarilis* is most important in Europe as well as many others) (Webb 1989); some fungi parasites; important disease agent is the heather rhizomorph fungus (*Marasmius androsaceus*)

10. **General facilitation:** General facilitation: seed fall, adventitious rooting from prostrate branches, soil disturbance (e.g. tracks, roading, fire, frost heave); heather is able to adapt to a wide range of environmental conditions due to both plastic and ecotypic responses to different conditions

11. Contributors and Date of last revision:

H. Keys, Tongariro/Taupo Conservancy, DOC, April 1991
C. Jones, Tongariro/Taupo Conservancy, DOC, April 1991
Colin C. Ogle, DOC, Wanganui, June 1992

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** heather
Formal name: *Calluna vulgaris* (L)
2. **Illustration:** Keble Martin, W. 1976: The concise British flora in colour, Ebury Press, London. Plate 55.
3. **Impact on biota and ecosystem**
very large

Plant -plant relationships
invasive and out competes native and introduced grasses and natives of tussocklands; drastically reduces species diversity

Plant -animal relationships
reduces diversity of native insect fauna

Ecosystem
low fertility, medium to high moisture, acid soil communities including peat are converted to heathland by (1) dense litter and canopy preventing germination of other plants beneath and (2) soil and podzolization due to slow break down of tannin-rich litter
4. **Management:**

Hand control
trialed but no control achieved after three years on Mount Hauhangatahi (see also Combination); hand pulling and grubbing are not advised because any part of the stem in the ground may give rise to adventitious regrowth; the inevitable disturbance will also favour the germination of any seed left in the ground

Chemical control
see Chemical Control Sheet

Combination
research proposal put up on control using herbicides Paraquat and Grazion (new) and hand pulling

Biological control
heather beetle currently under investigation; EIA published in January 1991 demonstrating that heather is an appropriate target for biocontrol
5. **Legislation:** none
6. **References:**
Chapman, H 1984: The ecology of heather in New Zealand (unpublished) PhD thesis, Otago University. Chapman, H.M. and Bannister, P. 1990: The spread of heather into Tongariro National Park. *NZ Journal Ecology* 4: 7-16. Gillingham, C.H. 1960: Biological flora of British Isles. *Calluna vulgaris* (L) Hull. *Journal of Ecology* 48: 455-483. Hobbs. R.J.: Malik. A.V. and Gillingham, C.H. 1984: Studies on fire in Scottish heathland communities III, *Journal of Ecology* 72: 963-976.
7. **Other sources of information and current projects:**
Heather control workshop proceedings, DOC. Turangi 1988, 68pp. Biological control of heather in New Zealand - and environmental impact assessment, DSIR Christchurch 1991, 145 p. Heather control programme, DOC, Turangi including research on control methods, mapping and targeting. Many other scientific papers mainly from Europe.
8. **Contributors and Date of last revision:**
H. Keys, Tongariro/Taupo Conservancy, DOC, April 1991
C. Jones, Tongariro/Taupo Conservancy, DOC, April 1991
Colin C. Ogle, DOC, Wanganui, June 1992

CHEMICAL CONTROL SHEET

Weed species common name: heather

User & Location	Chemical	Application Rate	Method of Application	Season of Application	Periodicity	Success Rating
Harry Keys, Tongariro/Taupo	Roundup Escort	1% 0.05%	Cut at base and spray stump	Flowering Feb-April	Annual, with follow up for missed plants and new seedlings	12 out of 12 plants appeared dead 10 months after trial

Ageratina adenophora Mexican devil

TAXON SHEET

1. **Common name:** bone-seed, bitou bush
Family: Asteraceae
Formal name: *Chrysanthemoides monilifera*
Synonym: *Osteospermum monilifera*
2. **Growth form:** shrub
3. **Distribution:** North Island: throughout, mainly coastal
South Island: Nelson City, Port Hills, Andersons Bay
4. **Habitat:** coastal, lowland
5. **Communities:** cliffs, waste places, shrubland, sand dunes, gumland
6. **Fertility:** low
7. **Response to environment:**

Response to

drought	tolerant
shade	intolerant
frost	
poor drainage	intolerant
physical damage	reasonably tolerant
grazing	
fire (plants, seeds)	assists germination
other	

Seedling requirements and tolerances

Growth rates

seedlings
adults

8. Growth and reproduction:

Breeding system

flowering type

method of pollination

other comments

Life cycle

type

flowering time September-February (May)

fruiting time

other comments

Deciduous/evergreen

Age of reproduction

sexual

asexual

Life span (years)

Seed

production tens of thousands of seeds per plant

dispersal

viability

germination

seed bank extensive

Vegetative reproduction

Comments

seeds have hard protective cover

9. Browsers and parasites:

fruit eaten by possum

10. General facilitation: bird dispersed drupe; dispersed primarily by soil disturbance

11. Contributors and Date of last revision:

SMT, January 1994, compiled from:

Northland Conservancy DOC Weed Control Manual [no date]

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** bone-seed
Formal name: *Chrysanthemoides monilifera*
2. **Illustration:** Upritchard, E.A. comp. 1985: A guide to the identification of New Zealand common weeds in colour. NZ Weed and Pest Society, Hastings.

3. **Impact on biota and ecosystem**

Plant -plant relationships

can displace low coastal vegetation, some shrub species, and seedlings of larger trees

Plant -animal relationships

Ecosystem

potential to infest islands; creates heavy shade in environments where high light levels occur normally

4. **Management:**

Hand control

hand pull all but the largest plants

Mechanical

Chemical control

Velpar
Tordon Brushkiller

Combination

Biological control

Other

5. **Legislation:** none

6. **References:**

Anderson, T. 1984: Bitou bush (*Chrysanthemoides monilifera* ssp. *rotundata*) control in Wide Bay district, Queensland. *Proceedings of the Seventh Australian Weeds Conference 1*: 200-204.

Lane, D., Shaw, K. 1978: The role of fire in bone seed (*Chrysanthemoides monilifera* (L.) Nod.) control in bushland. *Proceedings of the First Conference of the Council of Australian Weed Sciences Societies*: 333-335.

Weiss, P.W. 1981: Seed dynamics of bone seed and coastal wattle in relation to their potential invasiveness. *Proceedings of the Sixth Australian Weed Conference 1*: 25-28

Weiss, P.W. 1984: Seed characteristics and regeneration of some species in coastal communities. *Australian of Ecology 9*: 99-106.

Weiss, P.W. 1986: The biology of Australian weeds. 14. *Chrysanthemoides monilifera* (L.) T. Norl. *Journal of the Australian Institute of Agricultural Science 52*: 127-134.

7. **Other sources of information and current projects:**
control currently being investigated in Australia

8. **Contributors and Date of last revision:**

SMT, January 1994, compiled from:
Northland Conservancy DOC Weed Control Manual [no date]

Clematis vitalba old man's beard

TAXON SHEET

1. **Common name:** old man's beard
Family: Ranunculaceae
Formal name: *Clematis vitalba* L.
Synonym: none
 2. **Growth form:** climber
 3. **Distribution:**
[abundance rating = low (l), medium (m), high (h) for present/potential infestation]

Northern (l/l)
Waikato (l/m)
Eastern North Island (m/m)
Wanganui (h/h)
Nelson/Marlborough (h/h)
West Coast (l/m)
Canterbury (m/m)
Southland (l/l)
 4. **Habitat:** coastal, lowland
 5. **Communities:** tall forest, low forest, scrub and forest margin, shrubland
 6. **Fertility:** moderate to high fertility, medium to good drainage
 7. **Response to environment:**

Response to
drought recovers from wilting in pots; otherwise unknown
shade light demanding for growth and sexual reproduction
frost tolerant, partly because deciduous
poor drainage

physical damage recovers rapidly by resprouting from stems
grazing grazed, but resprouts rapidly
fire (plants, seeds) unknown
other
- Seedling requirements and tolerances
- Growth rates
seedlings young plants and new shoots can grow up to 2 m per year
adults

8. Growth and reproduction:

Breeding system

flowering type hermaphrodite
method of pollination wind pollinated
other comments

Life cycle

type perennial
flowering time Dec-May
fruiting time March-Oct
other comments

Deciduous/evergreen deciduous

Age of reproduction

sexual 1-3 years
asexual less than 1 year

Life span (years) individual plants probably grow for more than 30 years

Seed

production yes, massive seed production
dispersal gravity, wind, water, human, vertebrates, other
viability viability high initially, but drops rapidly
germination germinates in spring with adequate light
seed bank some seed retained for up to 5 years in the soil

Vegetative reproduction

rooting from stem fragments and attached stems

Comments

9. Browsers and parasites:

New Zealand: a few generalists; Lepidoptera, diptera, rust fungi;
elsewhere: *Xylocleptes bispinus*, a stem borer, occurs in Britain

10. General facilitation:

11. Contributors and Date of last revision:

Carol West, Southland Conservancy, DOC, March 1989

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** old man's beard
Formal name: *Clematis vitalba* L.
2. **Illustration:** Upritchard, E.A. 1985: A guide to the identification of New Zealand common weeds in colour. NZ Weed & Pest Control Society Inc., Hastings.
Keble Martin, W. 1976: The concise British flora in colour. plate 1.
Porteous, T. 1993: Native forest restoration. QEII National Trust, Wellington.
3. **Impact on biota and ecosystem**
very large
Plant -plant relationships
scrambles and climbs over other vegetation including tall trees, denying them light; branches break off with weight of vine; prevents regeneration in forest gaps by blocking light to the ground and preventing establishment of other species
Plant -animal relationships
has not been studied in detail; by killing native woody plants, it destroys food sources for native species including birds, lizards, and insects; has been implicated in stock poisoning but this is not proven
Ecosystem
reduces forest live biomass by killing trees, but increases dead material; effect on nutrient regime unknown
Other
catchment authorities concerned about its effect on willow trees lining river verges that provide river control
4. **Management:**
Hand control
small seedlings can be pulled out
Mechanical
large stems have to be cut, roots grubbed out and placed off the ground
Chemical control
variety of sprays effective (e.g. Roundup 2%, Escort 35 g per 100 L, Versatil); spray aerially if in trees, from ground if in lower vegetation
Combination
cut vines at waist height in winter and spray regrowth in spring as above
Biological control
control investigations under way in New Zealand (Landcare); elsewhere not practised
5. **Legislation:** declared a Class B target noxious plant in those DNPA's where infestations are considered eradicable
6. **References:** Buxton, J.M. 1985: The potential for biological control of *Clematis vitalba* L. Unpublished MSc Thesis, Imperial College, Ascot.
Popay, A.I. 1986: Chemical control of old man's beard (*Clematis vitalba*). Protect, Official Journal of the Noxious Weeds Inspectors' Institute Inc. 7(2): 23-25.
van Gardingen, J.R. 1986: The physiological ecology of *Clematis vitalba*. MSc thesis, University of Canterbury.
West, C.J. 1991: Literature review of the biology of *Clematis vitalba* (old man's beard). DSIR Land Resources Vegetation Report 725.
West, C.J. 1992: Ecological studies of *Clematis vitalba* (old man's beard) in New Zealand. DSIR Land Resources Vegetation Report 736.
many other papers and reports referenced in West 1991, 1992.

7. Other sources of information and current projects:

Department of Lands & Survey 1984: Distribution and control of the introduced weed, old man's beard (*Clematis vitalba*). Dept Lands & Survey Information Series 11.

Keating, R., Challis, J.A. 1985: Distribution of *Clematis vitalba* (old man's beard) in New Zealand. Noxious Plants Council report. Noxious Plants Council report.

8. Contributors and Date of last revision:

Carol West, Southland Conservancy, DOC, Invercargill, March 1989

Cortaderia jubata purple pampas grass

TAXON SHEET

1. **Common name:** purple pampas grass
Family: Poaceae (Gramineae)
Formal name: *Cortaderia jubata*
Synonym: *Gynerium jubatum*
2. **Growth form:** grass
3. **Distribution:**
[abundance rating = low (l), medium (m), high (h) for present/potential infestation]

North Auckland, Auckland, Coromandel (h/h)
Waikato, Bay of Plenty (m/h)
Poverty Bay, Hawkes Bay, New Plymouth, Wellington (l/h)
Nelson-Marlborough (l/h)
4. **Habitat:** coastal, lowland
5. **Communities:** scrub and forest margin, shrubland, sand dune, cliff, bluff, riverbed
6. **Fertility:** low, low-moderate, moderate, high
7. **Response to environment:**

Response to

drought	seedlings intolerant, adults tolerant
shade	tolerant of light shade
frost	slightly tolerant at seedling stage, tolerant when mature
poor drainage	seedlings intolerant to slightly tolerant
physical damage	cutting results in regrowth
grazing	regrowth; frequent or continuous grazing results in death of plants
fire (plants, seeds)	burning results in vegetative regrowth and creates a seedbed for invasion from surrounding areas
other	any disturbance of the soil in the vicinity of the plant resulting from control measures provides a potential seedbed for new infestations

Seedling requirements and tolerances

very vulnerable to frost (including frost heave), sun scorch and drought;
soil fertility apparently not a limiting factor

Growth rates

seedlings
adults

8. Growth and reproduction:

Breeding system autonomous apomixis
flowering type apomictic
method of pollination wind
other comments all plants are female and all flowers are capable of producing seed without pollination resulting in an extremely large potential output by every plant

Life cycle
type perennial
flowering time late January-mid March
fruiting time March-April
other comments

Deciduous/evergreen evergreen

Age of reproduction
sexual 1 year
asexual

Life span (years) at least 8 years

Seed
production yes, reported as averaging one million per inflorescence in first year of flowering in California
dispersal gravity, wind, man, vertebrates
viability high initially but soon drops
germination autumn
seed bank unlikely to form a long term seed bank

Vegetative reproduction
readily cultivated from divisions

Comments

9. Browsers and parasites:

palatable to cattle

10. General facilitation:

principally by seeds carried by wind; also attached to humans, animals and machinery and in gravel; establishment favoured by disturbance

11. Contributors and Date of last revision:

F.B. Knowles, FRI, Rotorua, March 1991

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** purple pampas grass
Formal name: *Cortaderia jubata*
2. **Illustration:** Knowles, F.B., Ecroyd C.E. 1985: 10
New Zealand Forest Service, Forest Research Institute 1984: 4
(see references below)
3. **Impact on biota and ecosystem**
Plant -plant relationships
invades disturbed areas, cleared bush margins, burned areas, firebreaks;
competes with and smothers other vegetation

Plant -animal relationships
habitat for rats and mice

Ecosystem
buildup dry material (dead leaves, leaf bases and flowering stalks) is a
significant fire hazard
4. **Management:**
Hand control digging and grubbing -seedlings and small plants
Mechanical chainsaw - small plants (watch for regrowth), bulldozer -large plants
Chemical control see Chemical Control Sheet
Combination hand control (e.g. cutting) or mechanical control (e.g. chainsaw) can be
combined with chemical spraying of new growth as necessary
Biological control no information; biological control agents likely to put native species of
Cortaderia at risk
5. **Legislation:** declared a Class B noxious weed with target status in 20 DNPA's in
1986
6. **References:** Anon. 1985: Pampas grass -a weed of plantation forests. New Zealand Forest Service,
Wellington (a pamphlet).
Costas-Lippman, Martha 1976: Ecology and reproductive biology of the genus
Cortaderia in California. PhD thesis. University of California, Berkely 365pp.
Davenport, N.A. 1988: Herbicides for pampas grass control. *Proceedings of the 41st New
Zealand Weed and Pest Control Conference*: 156-159.
Gadgil, R.L. 1984: Pampas -a new forest weed problem. *Proceedings of the 37th New
Zealand Weed and Pest Control Conference*: 187-190.
Knowles, F.B., Ecroyd C.E. 1985: Species of *Cortaderia* (pampas grasses and toetoe) in
New Zealand. *Forest Research Institute Bulletin* 105: 24.
New Zealand Forest Service, Forest Research Institute 1984: Pampas -recognition of a
new forest weed. *Whats New in Forest Research* 128: 6.
Papers by H.E Connor in *NZ Journal of Botany* on breeding systems in *Cortaderia*.
7. **Other sources of information and current projects:**
Forest Research Institute, Rotorua, for information on control
8. **Contributors and Date of last revision:**
F.B. Knowles, FRI, Rotorua, March 1991

CHEMICAL CONTROL SHEET

Weed species common name: purple pampas grass

User & Location	Chemical	Application Rate	Method of Application	Season of Application	Periodicity	Success Rating
Scattered smaller plants	Noel Davenhill FRI Nursery Rotorua	Roundup	200 ml/10 L *	knapsack	Spring-autumn	100% kill with 1 st spraying *
Extensive ground cover			8-12 L/50-100 L *	Aerial (broadcast spray)	Spring-autumn	
Scattered larger lumps			1 L/100 L	brushgun	Spring-autumn	
Scattered smaller plants		Galant (May be tank-mixed with simazine, atrazine gardoprim or versatil for wider or longer term control)	300 ml/10 L	knapsack	Spring-autumn	100% kill with 1 st spraying (1% v/v emulsifiable crop oil must be added)
Scattered larger clumps			120 ml/1 L	Spotgun	Spring-autumn	
Scattered smaller plants			1 L/100 L	brushgun	Spring-autumn	
Scattered small plants only		Velpar 90	25 g/1 L 60 g/10 L	spotgun knapsack	Spring-autumn	May require follow-up treatments (Velpar not recommended for large plants)
"		Velpar L	110 ml/1 L 20 ml/10 L	spotgun knapsack	Spring-autumn	

* For residential control add simazine or gardoprim; complete wetting essential

Cortaderia selloana pampas grass

TAXON SHEET

1. **Common name:** pampas grass
Family: Poaceae (Gramineae)
Formal name: *Cortaderia selloana*
Synonym: *Gynerium argenteum*
2. **Growth form:** grass
3. **Distribution:**
[abundance rating = low (l), medium (m), high (h) for present/potential infestation]

North Auckland, Auckland, Coromandel (h/h)
Waikato, Bay of Plenty (m/h)
Poverty Bay, Hawkes Bay, New Plymouth, Wellington (l/m-l)
Nelson-Marlborough (l/m-h)
4. **Habitat:** coastal, lowland, sealevel-800m
5. **Communities:** scrub and forest margin, sand dune, cliff, bluff, riverbed, primary habitat is disturbed ground
6. **Fertility:** low, low-moderate, moderate, high
7. **Response to environment:**

Response to
drought seedlings intolerant, adults tolerant
shade tolerant of all but very heavy shade
frost slightly tolerant at seedling stage; tolerant (to at least -9°C without damage) when adult
poor drainage seedlings intolerant to slightly tolerant

physical damage cutting results in resprouting
grazing regrowth but frequent or continuous grazing often results in death of plants
fire (plants, seeds) burning results in vegetative regrowth and creates an excellent seedbed for seed blown in from surrounding areas
other any disturbance of the soil in the vicinity of the plant resulting from control measures provides a potential seedbed for new infestations

Seedling requirements and tolerances

very vulnerable to frost (including frost heave), sun scorch and drought;
soil fertility apparently not a limiting factor

Growth rates

seedlings
adults

8. Growth and reproduction:

Breeding system dioecious
flowering type female and hermaphrodite plants c. 50/50 in natural populations
method of pollination wind
other comments female plants require pollination by hermaphrodite plants to set seed; hermaphrodite plants act principally as pollinators but are capable of setting a small amount of seed if pollinated by another hermaphrodite plant

Life cycle
type perennial, natural spread from seed
flowering time mid March-May
fruiting time April-May
other comments

Deciduous/evergreen evergreen

Age of reproduction
sexual 1-3 years
asexual

Life span (years) at least 8 years (records of up to 40 years in Botanic Gardens)

Seed
production yes, at least 90,000-100,000 per seed head
dispersal gravity, wind, humans, vertebrates
viability high initially (at least 90%) but soon drops
germination autumn
seed bank unlikely to form a long term seed bank

Vegetative reproduction
readily cultivated from divisions

Comments

9. Browsers and parasites:

palatable to cattle

10. General facilitation:

principally by seeds carried by wind - also attached to humans, animals, and machinery and in gravel; establishment favoured by disturbance

11. Contributors and Date of last revision:

Knowles, F.B. Forest Research Institute, Rotorua, March 1991
N. Davenhill, Forest Research Institute, Rotorua, March 1991
C. Ecroyd, FRI, Rotorua, March 1991

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** pampas grass
Formal name: *Cortaderia selloana*
2. **Illustration:** Knowles, F.B., Ecroyd C.E. 1985: 10.
NZ Forest Research Institute 1984: 4 (references below).
3. **Impact on biota and ecosystem**
 - Plant -plant relationships
invades disturbed areas, e.g. cleared bush burned areas, firebreaks;
competes with and smothers other vegetation
 - Plant -animal relationships
habitat for rats and mice
 - Ecosystem
buildup of dry material such as dead leaves, leaf bases and flowering stalks is a significant fire hazard; can be a particular problem after control operations
4. **Management:**
 - Hand control
digging and grubbing possible for seedlings and small plants
 - Mechanical
chainsaw smaller plants but watch for regrowth; sizeable plants can be eliminated by bulldozer
 - Chemical control
 - Combination
mechanical control (e.g. chainsaw) or hand control (e.g. cutting) can be combined with chemical spraying of regrowth as necessary
 - Biological control
no information; biological control agents likely to put native species of *Cortaderia* at risk; grazing of stock on coastal dune forests likely to encourage pampas grass at the expense of palatable native toetoe
5. **Legislation:** none
6. **References:**

Costas-Lippman, Martha 1976: Ecology and reproductive biology of the genus *Cortaderia* in California. PhD thesis. University of California, Berkely 365pp.

Knowles, F.B., Ecroyd C.E. 1985: Species of *Cortaderia* (pampas grasses and toetoe) in New Zealand. *Forest Research Institute Bulletin* 105: 24.

New Zealand Forest Service, Forest Research Institute 1984: Pampas - recognition of a new forest weed. *Whats New in Forest Research* 128: 6.

Papers by H.E Connor in *NZ Journal of Botany* on breeding systems in *Cortaderia*.
7. **Other sources of information and current projects:**
Forest Research Institute, Rotorua, for information on control
8. **Contributors and Date of last revision:**
F.B. Knowles, Forest Research Institute, Rotorua, March 1991
N. Davenport, Forest Research Institute, Rotorua, March 1991
C. Ecroyd, FRI, Rotorua, March 1991

Crataegus monogyna hawthorn

TAXON SHEET

1. **Common name:** hawthorn
Family: Roseaceae
Formal name: *Crataegus monogyna*
Synonym:
 2. **Growth form:** small tree
 3. **Distribution:**
[abundance rating = low (l), medium (m), high (h) for present/potential infestation]

Nelson/Marlborough (m/h)
Westland (l/l)
Canterbury (m/h)
Otago, Southland (l/m)
Wanganui (m/m)
 4. **Habitat:** lowland, montane
 5. **Communities:** low forest, scrub and forest margin, shrubland, hill country pasture
 6. **Fertility:** low, low-moderate
 7. **Response to environment:**

Response to
drought tolerant
shade tolerant
frost highly tolerant
poor drainage intolerant

physical damage resprouts from base when damaged and from root suckers
grazing seedlings susceptible, adults moderately resistant; bark not eaten
fire (plants, seeds) can recover from minor fire damage
other
- Seedling requirements and tolerances
require damp soil and prefer light shade
- Growth rates
seedlings rapid, 25 cm in 2 months in glass house
adults range from 0.15 to 0.30 m/year

8. Growth and reproduction:

Breeding system

flowering type monoecious
method of pollination insect, non-specialist
other comments

Life cycle

type perennial
flowering time early Spring; August-October
fruiting time Autumn; may onwards
other comments large amount of fruit produced

Deciduous/evergreen deciduous

Age of reproduction

sexual probably about 5 years
asexual n/a

Life span (years) at least 150 years

Seed

production yes, large amount of fruit
dispersal vertebrates (birds and possum)
viability % unknown
germination requires overwintering, enhanced by passage through birds
seed bank seed bank time in seed bank unknown, but does enter seed bank, at least in upper soil layers

Vegetative reproduction

none, although individuals may give rise to separate individuals if damaged

Comments

9. Browsers and parasites:

10. General facilitation:

originally grown as an ornamental and hedge plant, major spread now is by birds; spread is facilitated by reversion of hill-country into low scrub of matagouri, bracken, or broom which is then colonised by hawthorn

11. Contributors and Date of last revision:

P.A. Williams, Landcare Research, Nelson, January 1991
Colin C. Ogle, DOC, Wanganui, June 1992

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** hawthorn
Formal name: *Crataegus monogyna*
2. **Illustration:** Wilson, Hugh 1982: Stewart Island Plants. Field Guide Publications, Christchurch. p87.
Keble Martin, W. 1976: The concise British flora in colour. Ebury Press, London. plate 31.
Porteous, T. 1993: Native forest restoration. QEII National Trust. Wellington.
3. **Impact on biota and ecosystem**
medium

Plant -plant relationships

crowds out native shrub and early successional native species especially on forest margins and clearings in forest; may persist for long periods in these circumstances; host for *Ileostylus micranthus* (the only Wanganui sites for this mistletoe)

Plant -animal relationships

unknown, but fruit may provide food source for native birds

Ecosystem

probably not major impact

4. **Management:**

Hand control

cut with chainsaw, axe or slasher

Mechanical

Chemical control

Escort (35 g per 100 L) and Roundup (1%) plus Pulse are registered as being suitable, use knapsack and/or gun and hose; apply 20% Roundup to cut stump, frilled stem or by injection; apply Roundup from late flowering to early leaf yellowing; spray Escort November to March and ensure full coverage of foliage and stems

Combination

cut and paint stump with herbicide, e.g. Tordon Brushkiller (20%) or Escort

Biological control

5. **Legislation:** class B noxious plant in most regions, target or widespread
6. **References:** Burgason, B. 1978: Prescribed burning for management of hawthorn and alder. *New York Fish and Game* 23: 160-1 69.
Williams, P.A., Buxton, R. 1986: Hawthorn (*Crataegus monogyna*) populations in mid-Canterbury. *NZ Journal of Ecology* 9: 11-17.
Williams, P.A., Buxton, R.P. 1989: Response to reduced irradiance of 15 species of native and adventive shrub and tree seedlings from eastern Canterbury. *NZ Journal of Ecology* 12: 95-1 01.
7. **Other sources of information and current projects:**
8. **Contributors and Date of last revision:**
P.A. Williams, Landcare Research, Nelson, January 1991
Colin C. Ogle, DOC, Wanganui. June 1992
additional information from: Porteous, T. 1993 (see above)

Cytisus scoparius broom

TAXON SHEET

1. **Common name:** broom
Family: Fabaceae
Formal name: *Cytisus scoparius* (L.) Link
Synonym: *Sarothamnus scoparius* (L.)
'Spartium scoparium' Wimmer

2. **Growth form:** shrub

3. **Distribution:**
[abundance rating = low (l), medium (m), high (h) for present/potential infestation]

broom is present throughout most of New Zealand and is a serious weed problem in eastern parts of the South Island and in the Central North Island; 25,624 ha of the South Island were reported to have greater than 40% cover in 1979; has the potential to occupy a much greater area than it occupied then

4. **Habitat:** lowland, montane

5. **Communities:** shrubland, tall tussockland, short tussockland, cliff, bluff, riverbed

6. **Fertility:** low-moderate, moderate, high

7. **Response to environment:**

Response to

drought	tolerant
shade	tolerant
frost	highly tolerant
poor drainage	intolerant

physical damage	plant will resprout if damage is not severe
grazing	can be killed by grazing, may resprout at low levels, and new seedlings will germinate, although these are highly susceptible to grazing
fire (plants, seeds)	plants killed, but large quantity of seed will germinate
other	

Seedling requirements and tolerances

grow taller (although lower dry weight) in shade (Williams 1981); wide tolerance of soil conditions

Growth rates

seedlings	3.2 cm in full light (up to 9.1 cm in shade) in 65 days in an unheated glasshouse
adults	in favourable sites broom plants grow to 2.5 m with many stems 2 cm in diameter in 2 years; above 1,000 m a.s.l. can still grow 1 m in 2 years, (Williams 1981)

8. Growth and reproduction:

Breeding system

flowering type angiosperm, hermaphrodite
method of pollination insects, large bees
other comments some self-pollination?

Life cycle

type perennial
flowering time November, earlier in warmer locations, later at higher altitudes
fruiting time December -January, later in cooler areas
other comments leaves present October -January, later in cooler areas

Deciduous/evergreen deciduous

Age of reproduction

sexual 2 years
asexual

Life span (years) 10-15 years

Seed

production yes, 9 seeds/pod and usually in excess of 2,000 pods/bush
dispersal explosive
viability high, requires scarification to germinate; long-lived
germination germinates readily, under a variety of conditions
seed bank substantial

Vegetative reproduction

Comments

9. Browsers and parasites:

goats, hares, cattle (minor extent); sheep eat seedlings and will browse bushes if short of feed; leaf-roller caterpillars (Tortricidae) occasionally cause some damage to foliage; *Oemonia birta* (lemon-tree borer) grubs and *Anisoplaca ptyoptera* caterpillars sometimes damage main stems of the plant

10. General facilitation: broom spreads by seed dispersed by its explosive pod, by water and by people along roads, tracks, railways

11. Contributors and Date of last revision:

P. Syrett, Landcare Research, Christchurch, June 1991

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** broom
Formal name: *Cytisus scoparius* (L.) Link
2. **Illustration:** Upritchard, E.A. 1985: A guide to the identification of NZ common weeds in colour. NZ Weed & Pest Control Society, Hastings, p.75.
Keble Martin, W. 1976: The concise British flora in colour. Ebury Press, London. plate 21.
Porteous, T. 1993: Native forest restoration. QEII National Trust, Wellington.
3. **Impact on biota and ecosystem**
medium
Plant -plant relationships
can displace grassland, inhibits growth of pine trees; may slow growth of native trees
Plant -animal relationships
seedlings grazed by stock and rabbits
Ecosystem
can provide shelter for seedlings of native shrubs and trees which eventually overtop and outlive broom bushes (Williams 1983)
4. **Management:**
Hand control
dig out; see Balneaves
Mechanical
Chemical control
Grazon 0.2-0.3%, handgun or knapsack; Tordon Brushkiller 0.25% handgun or knapsack plus Boost; Roundup 1% plus Pulse 0.1% knapsack or brushgun; Escort spray 35 g per 100L cut stump and apply 20% Roundup or 20% Tordon
Combination
Biological control
Leucoptera spartifoliella (Lepidoptera: Lyonetiidae, broom twigminer) is widely established and kills twigs and branches in some areas; *Bruchidnis villosus* (Coleoptera: Bruchidae, broom seed beetle) released, but not yet established; further work in progress to identify other biological control agents
5. **Legislation:** class B widespread and target noxious plant
6. **References:** Balneaves, J.M. 1982: A multiple spray regime for broom control in forestry operations. *Proceedings of the 35th New Zealand Weed and Pest Control Conference*. 157-161.
Scheele, S.M., Syrett, P. 1987: The broom twigminer, *Leucoptera spartifoliella* (Lepidoptera: Lyonetiidae), in New Zealand. *NZ Entomologist* 10: 133-137.
Syrett, P. 1987: The biological control of broom (*Cytisus scoparius*) in New Zealand - an environmental impact assessment. Entomology Division Report. DSIR. Christchurch.
Syrett, P., O'Donnell, D.J. 1987: A seed-feeding beetle for biological control of broom. *Proceedings of the 40th New Zealand Weed and Pest Control Conference* : 19-22.
Williams, P.A. 1981: Aspects of the ecology of broom (*Cytisus scoparius*) in Canterbury, New Zealand. *NZ Journal of Botany* 19: 31-43.
Williams, P.A. 1983: Secondary vegetation succession on the Port Hills, Banks Peninsula. Canterbury, New Zealand. *NZ Journal of Botany* 21: 237-247.
8. **Contributors and Date of last revision:**
P. Syrett, Landcare Research, Christchurch, June 1991

Dactylis glomerata
cocksfoot

TAXON SHEET

1. **Common name:** cocksfoot
Family: Poaceae
Formal name: *Dactylis glomerata*
Synonym:
2. **Growth form:** grass
3. **Distribution:** widespread, North and South Islands
4. **Habitat:** coastal, lowland, montane, subalpine
5. **Communities:** scrub and forest margin, shrubland, tall tussockland, short tussockland, herbfield, fernland, sand dune hollows, riverbed
6. **Fertility:**
7. **Response to environment:**

Response to

drought	slightly tolerant
shade	slightly tolerant
frost	tolerant
poor drainage	slightly tolerant

physical damage	resprout
grazing	resprout
fire (plants, seeds)	
other	

Seedling requirements and tolerances

Growth rates

seedlings
adults

8. Growth and reproduction:

Breeding system

flowering type

method of pollination wind

other comments

Life cycle

type perennial

flowering time

fruiting time

other comments

Deciduous/evergreen evergreen

Age of reproduction

sexual

asexual

Life span (years)

Seed

production yes

dispersal wind, water, humans, vertebrates

viability

germination

seed bank

Vegetative reproduction

tillers

Comments

9. Browsers and parasites:

10. General facilitation:

11. Contributors and Date of last revision:

Bill Lee, Landcare Research, Dunedin, March 1991

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** cocksfoot
Formal name: *Dactylis glomerata*
2. **Illustration:** Lambrechtsen, N.C. 1975: What grass is that? *DSIR Information Series* 87, p. 69
3. **Impact on biota and ecosystem**
 - Plant -plant relationships
 - Plant -animal relationships
 - Ecosystem
 - Other
4. **Management:**
 - Hand control
 - Mechanical
 - Chemical control
 - Combination
 - Biological control
 - Other
5. **Legislation:** none
6. **References:**
7. **Other sources of information and current projects:**
8. **Contributors and Date of last revision:**
Bill Lee, Landcare Research, Dunedin, March 1991

Egeria densa oxygen weed

TAXON SHEET

1. **Common name:** oxygen weed
Family: Hydrocharitaceae
Formal name: *Egeria densa* Planchon
Synonym:
2. **Growth form:** herb, submerged-semisubmerged aquatic macrophyte
3. **Distribution:**
[abundance rating = low (l), medium (m), high (h) for present/potential infestation]

Auckland (h/h)
Waikato (h/h)
Manawatu (h/h)
elsewhere North Island (l-m/h)
Marlborough (m/h)
Canterbury (l/h)
elsewhere South Island (absent/h)
4. **Habitat:** coastal, lowland
5. **Communities:** sand dune, lakes, wetland, other
6. **Fertility:** low-moderate, moderate, high
7. **Response to environment:**

Response to
drought intolerant
shade slightly tolerant
frost slightly tolerant
poor drainage highly tolerant

physical damage regrowth from buried stem apices and broken pieces
grazing regrowth from pieces
fire (plants, seeds)
other
- Seedling requirements and tolerances
only one sex present in New Zealand so no seedlings
- Growth rates
seedlings
adults grows fast enough to reach nuisance levels 3-9 months after herbicide treatment

8. Growth and reproduction:

Breeding system asexual
flowering type
method of pollination only male plants present in New Zealand
other comments

Life cycle
type
flowering time
fruiting time
other comments usually quiescent over winter

Deciduous/evergreen evergreen

Age of reproduction
sexual
asexual

Life span (years) perennial

Seed
production no
dispersal
viability
germination
seed bank

Vegetative reproduction
fragmentation

Comments

9. Browsers and parasites:

black swan, other herbivorous waterfowl, herbivorous fish; limited browsing by submerged invertebrates e.g. Hygraule (Lepidopteron), Limnaea (snail)

10. General facilitation:

spread between water bodies by water craft, fishing nets, or deliberate introductions; spread within a water body by water movement, or underground stem extension

11. Contributors and Date of last revision:

Paul Champion, NIWA, Hamilton, August 1992

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** oxygen weed
Formal name: *Egeria densa* Planchon
2. **Illustration:** Flora of New Zealand volume III p 28
3. **Impact on biota and ecosystem**
 - Plant -plant relationships
displaces all native species within zone from 0.5 to 6 m depth (depending on water clarity); can also displace other adventive water weeds e.g. Canadian pond weed (*Elodea canadensis*)
 - Plant -animal relationships
unknown
 - Ecosystem
decreases species diversity: several lakes which formerly supported dense beds of this species have no submerged vegetation now because oxygen weed totally clogs waterways e.g. Lake Whangape, Omapere
 - Other
aesthetic problems associated with surface reaching weed beds
4. **Management:**
 - Hand control
only relevant to very low infestation levels
 - Mechanical
mechanical harvesters available
 - Chemical control
(a) gel diquat (Torpedo), 60 l/ha, good control up to 9 months, but not eradication;
(b) liquid diquat (Reglone) if pond not too deep, do twice
 - Combination
diquat followed by introduction of grass carp
 - Biological control
Chinese grass carp; eradication of oxygen weed achieved in 2 lakes followed by establishment of indigenous vegetation
 - Other
infill waterways
5. **Legislation:** Noxious Plants Act 1978: nationally not for sale, propagation, or distribution;
Canterbury Region: Class B target noxious plant
6. **References:** Getsinger and Dillon, 1984: *Aquatic Botany* 20: 329-338.
Cook and Urmi-Konig, 1984: *Aquatic Botany* 19: 73-96
Wells and Clayton, 1991: *NZ Journal of Marine & Freshwater Research* 25: 62-70.
7. **Other sources of information and current projects:**
NIWA, Hamilton
Gavin Williamson, DOC, Rotorua (Lake Rotorua project)
8. **Contributors and Date of last revision:**
Paul Champion, NIWA, Hamilton, August 1992

Ehrharta erecta
veld grass

TAXON SHEET

1. **Common name:** veld grass
Family: Poaceae
Formal name: *Ehrharta erecta*
Synonym:
2. **Growth form:** grass
3. **Distribution:**
[abundance rating = low (l), medium (m), high (h) for present/potential infestation]

North Auckland (l/h)
Auckland (l/h)
Manawatu (l/h)
Wellington (h/h)

4. **Habitat:** coastal, lowland
5. **Communities:** sand dune, cliff, bluff
6. **Fertility:** low
7. **Response to environment:**

Response to

drought tolerant
shade very tolerant
frost
poor drainage tolerant

physical damage
grazing readily pulled out
fire (plants, seeds)
other

Seedling requirements and tolerances

Growth rates

seedlings very rapid; seeds germinate and become flowering plants very quickly
adults very rapid; seeds germinate and become flowering plants very quickly

8. Growth and reproduction:

Breeding system

flowering type
method of pollination
other comments

Life cycle

type
flowering time all year
fruiting time
other comments

Deciduous/evergreen evergreen

Age of reproduction

sexual
asexual

Life span (years)

Seed

production yes; large, all year round
dispersal wind, water, bird
viability
germination rapid
seed bank large

Vegetative reproduction

yes

Comments

9. Browsers and parasites:

- 10. General facilitation:** because veld grass can flower and seed in all months of the year there is a continuous rain of seed to be distributed by wind or water short distances or by birds longer distances

11. Contributors and Date of last revision:

SMT, February 1994, compiled from Ogle, C.C. 1988: Veld grass (*Ehrharta erecta*) has come to stay. *Wellington Botanical Society Bulletin* 44: 8-15

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** veld grass
Formal name: *Ehrharta erecta*
2. **Illustration:** Ogle, C.C. 1988 (see below).
3. **Impact on biota and ecosystem**
Plant -plant relationships
smothers low stature shrubs and herbs e.g. coastal communities

Plant -animal relationships

Ecosystem predominately on sites disturbed by human activity; in forests confined to canopy gaps
4. **Management:**
Hand control readily pulled out but eradication only possible in early stages of establishment

Mechanical

Chemical control would require repeat applications to deal with newly germinated plants

Combination

Biological control

Other
5. **Legislation:** none
6. **References:** Ogle, C.C. 1988: Veld grass (*Ehrharta erecta*) has come to stay. Wellington Botanical Society Bulletin 44: 8-15
7. **Other sources of information and current projects:**
8. **Contributors and Date of last revision:**
SMT, February 1994, compiled from Ogle, 1988 (see above)

Elaeagnus x reflexa
elaeagnus

TAXON SHEET

1. **Common name:** elaeagnus
Family: Elaeagnaceae
Formal name: *Elaeagnus x reflexa*
Synonym:
2. **Growth form:** woody climber
3. **Distribution:**
[abundance rating = low (l), medium (m), high (h) for present/potential infestation]

Auckland/Coromandel (l-m/m)
Wanganui (m/m)
Wellington (l/l)
4. **Habitat:** coastal, lowland
5. **Communities:** scrub and forest margin, secondary forest
6. **Fertility:** moderate, high
7. **Response to environment:**

Response to
drought tolerant
shade partly tolerant
frost intolerant
poor drainage intolerant

physical damage
grazing
fire (plants, seeds)
other

Seedling requirements and tolerances
 tolerant of partial shade

Growth rates
seedlings fast
adults fast

8. Growth and reproduction:

Breeding system

flowering type hermaphrodite?
method of pollination insect?
other comments

Life cycle

type vigorous perennial
flowering time March -May
fruiting time May, September
other comments

Deciduous/evergreen evergreen

Age of reproduction

sexual
asexual

Life span (years) long lived, probably over a century

Seed

production yes
dispersal birds
viability
germination
seed bank

Vegetative reproduction

Comments

9. Browsers and parasites:

10. General facilitation:

cultivation escape, especially in warmer northern areas, spreading from abandoned gardens and farms by seed

11. Contributors and Date of last revision:

Ewen Cameron, Auckland Institute & Museum, December 1990

IMPACTS AND MANAGEMENT SHEET

- 1. **Common name:** elaeagnus
Formal name: *Elaeagnus x reflexa*
- 2. **Illustration:** Porteous, T. 1993: Native forest restoration. QEII National Trust, Wellington.

- 3. **Impact on biota and ecosystem**
medium

Plant -plant relationships

scrambles and smothers particularly regenerating forest e.g. manuka

Plant -animal relationships

has spines, fleshy fruit eaten by birds

Ecosystem

Other

- 4. **Management:**

Hand control

Mechanical

extremely difficult; slash or chainsaw all growth to ground level, cut all bark off stumps and paint liberally with brushweed herbicide or Yates stump stick; cover stumps with sacking or black plastic to block out all light

Chemical control

2% Roundup for knapsack or brush gun; repeat treatments may be necessary

Combination

cut stump, apply 20% Roundup or 20% Brushkiller; frilling or injection use 20% Roundup or undiluted Brushkiller at 1.5 ml per cut/hole or Escort

Biological control

Other

- 5. **Legislation:** none

- 6. **References:**

- 7. **Other sources of information and current projects:**

- 8. **Contributors and Date of last revision:**

Ewen Cameron, Auckland Institute & Museum, December 1990

additional information: Northland Conservancy DOC Weed Control Manual [no date]
Porteous, T. 1993 (no date)

Erica lusitanica
Spanish heath

TAXON SHEET

1. **Common name:** Spanish heath
Family: Ericaceae
Formal name: *Erica lusitanica*
Synonym:

2. **Growth form:** shrub

3. **Distribution:**
[abundance rating = low (l), medium (m), high (h) for present/potential infestation]

Northland-Auckland (l/m)
Central North Island (m/m)
Eastern N. Island (l/l)
Taranaki (l/l)
Southern N. Island (m/m)
Nelson (m/h)
Marlborough (l/l)
Westland (l/l)
Canterbury (m/m)
Otago (l/m)
Southland (l/m)

4. **Habitat:** coastal, lowland, montane

5. **Communities:** scrub and forest margin, shrubland, tall tussockland, short tussockland, herbfield, fernland

6. **Fertility:** low, low-moderate

7. **Response to environment:**

Response to
drought slightly tolerant
shade slightly tolerant
frost slightly tolerant
poor drainage tolerant

physical damage resprouts from damaged base, but does not layer
grazing seedlings killed, but once greater than 5 cm tall, develops side shoots and established plants quite resistant to browsing
fire (plants, seeds) resprouts from base following wild fires; seeds (in soil) stimulated to germinate following fire
other

- Seedling requirements and tolerances
require moist conditions and moderate light high levels, rather delicate

- Growth rates
seedlings grow to 0.75m in 5 years under a grazing regime
adults single shoots on adults grow 10-20 cm/yr in Canterbury; plants reach 2 m in 10 years on good sites

8. Growth and reproduction:

Breeding system

flowering type monoecious
method of pollination insect, possibly also wind
other comments flowers scented

Life cycle

type perennial
flowering time late autumn to early winter, March-Dec (June in Coromandel, August in Canterbury)
fruiting time germinable seed present in capsules in early spring
other comments

Deciduous/evergreen evergreen

Age of reproduction

sexual 3-4 years
asexual n/a

Life span (years) 40-50 years maximum

Seed

production yes, 60-100/capsule, millions per bush
dispersal gravity, wind, water, humans, vertebrates (wool, feet)
viability seed requires vernalization and viability declines only slowly with time
germination greatest in dark at low temperatures for fresh seed, greatest in fluctuating temperature in the light
seed bank vast seed banks, containing 480,000 seed/m²

Vegetative reproduction

none

Comments

seed viable in soil for at least two years, but probably much longer

9. Browsers and parasites:

several organisms have been found on the plant, but their combined effect is minimal: aphid (*Myzoz ornatus*), ladybird, a *Psochid*, a tortricid (*Planotortrix notophaea*)

10. General facilitation:

spread by horticultural activities, animals, wind and machinery; occupies bare ground in a wide range of sites; encouraged by burning hill country

11. Contributors and Date of last revision:

P.A. Williams, Landcare Research, Nelson, December 1990

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** Spanish heath
Formal name: *Erica lusitanica*
2. **Illustration:** Upritchard, E.A. 1985: A guide to the identification of New Zealand common weeds in colour. NZ Weeds & Pest Control Society, Hastings. p78.
3. **Impact on biota and ecosystem**
medium

Plant -plant relationships

invades open land and grassland, displacing native species; invades areas after burning, displacing native secondary shrub species

Plant -animal relationships

Unknown

Ecosystem

increase biomass of grassland; very flammable

Other

4. **Management:**

Hand control

seedlings and young plants can be pulled, and grubbed

Mechanical

not useful because of resprout ability

Chemical control

Tordon 1050 commonly used; a couple of handfuls of lime placed around root system will change soil to alkaline and kill plant

Combination

crushing, followed by fire has been used with success by Forest Service control

5. **Legislation:** declared noxious plant class B target in some areas

6. **References:**
Brookes, C.K. 1986: Aspects of *Erica lusitanica* invasion in the Silverpeaks area BSc Hons. project, Otago University, Dunedin.
Mather, L.J. and Williams P.A. 1990: Phenology, seed ecology, and age structure of Spanish heath in Canterbury. NZJ Botany 28: 207-215.
Mather, L.J. 1985: Aspects of fire ecology and distribution of Spanish heath in New Zealand. Unpublished DSIR Report.
Wassilieff, M. 1982: Secondary succession in the lowland forests of the Marlborough Sounds Maritime Park. PhD thesis, Victoria University of Wellington.

7. **Other sources of information and current projects:**

8. **Contributors and Date of last revision:**

P.A. Williams, Landcare Research, Nelson, December 1990
additional information: Northland Conservancy DOC Weed Control Manual [no date]

Gymnocoronis spilanthoides

Senegal tea

TAXON SHEET

1. **Common name:** Senegal tea
Family: Asteraceae
Formal name: *Gymnocoronis spilanthoides*
Synonym:

2. **Growth form:** perennial aquatic herb

3. **Distribution:**
[abundance rating = low (l), medium (m), high (h) for present/potential infestation]

Auckland (l/h)
Waikato (l/h)
Bay of Plenty (l/h)

4. **Habitat:** aquatic

5. **Communities:** wetland, still or flowing water

6. **Fertility:**

7. **Response to environment:**

Response to

drought	intolerant
shade	tolerant
frost	tolerant; can survive under water
poor drainage	tolerant

physical damage
grazing
fire (plants, seeds)
other

Seedling requirements and tolerances

Growth rates

seedlings	
adults	adults growth rate of 15 cm a week in fertile situations; can continue to grow underwater although growth rates are slower and plants stunted

8. Growth and reproduction:

Breeding system

flowering type

method of pollination

other comments in the same tribe, Eupatorieae, as the common northern weeds mist flower and Mexican devil

Life cycle

type summer and autumn

flowering time

fruiting time dormant in the winter, producing shoots in spring

other comments

Deciduous/evergreen evergreen

Age of reproduction

sexual

asexual

Life span (years)

Seed

production yes

dispersal water

viability

germination

seed bank

Vegetative reproduction

roots at stem nodes, can spread by vegetative fragmentation

Comments

9. Browsers and parasites:

- 10. General facilitation:** originally introduced as an aquarium plant; grows as a floating mat in still or flowing water or on wet marshy soils; stem fragments may be spread by water movement, planting, drainage machinery; seed dispersed by water or in mud sticking to animals or machinery

11. Contributors and Date of last revision:

SMT, February 1994, compiled from: Position paper prepared by Paul Champion, Aquatic Plants, MAF Quality Management, Hamilton, September 1993

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** Senegal tea
Formal name: *Gymnocoronis spilanthoides*
2. **Illustration:**
3. **Impact on biota and ecosystem**
 - Plant -plant relationships
invades the marginal vegetation in both flowing and stationery waterbodies; excludes other plants
 - Plant -animal relationships
 - Ecosystem
can cause major obstructions to waterways and cause flooding
4. **Management:**
 - Hand control
 - Mechanical
should be done with caution so as not to spread fragments of the plant down stream or contaminate machinery
 - Chemical control
good control with glyphosate by Manukau City Council although timing of application appears critical
 - Combination
 - Biological control
 - Other
dispose of plants by deep burial or incineration
5. **Legislation:**
class B noxious plant nationally, class B target in Auckland Region
6. **References:**
7. **Other sources of information and current projects:**
8. **Contributors and Date of last revision:**
SMT, February 1994, compiled from: Position paper prepared by Paul Champion, Aquatic Plants, MAF Quality Management, Hamilton, September 1993

Hakea gibbosa
downy hakea

TAXON SHEET

1. **Common name:** downy hakea
Family: Proteaceae
Formal name: *Hakea gibbosa*
Synonym:
 2. **Growth form:** shrub
 3. **Distribution:**
[abundance rating = low (l), medium (m), high (h) for present/potential infestation]

Northland (m/?)
Auckland (l/?)
Bay of Plenty (l/?)
Great Barrier (?)
 4. **Habitat:** coastal, lowland
 5. **Communities:** scrub and forest margin, shrubland, gumland
 6. **Fertility:** low
 7. **Response to environment:**

Response to
drought highly tolerant
shade intolerant
frost intolerant
poor drainage slightly tolerant

physical damage
grazing adults resistant
fire (plants, seeds) adults and young plants killed by fire but follicles release viable seed
other
- Seedling requirements and tolerances
require high light, as in bare ground
- Growth rates
seedlings
adults

8. Growth and reproduction:

Breeding system

flowering type monoecious
method of pollination insect
other comments produces mass of small flowers

Life cycle

type perennial
flowering time spring, June-August
fruiting time always present because follicles persist on trees
other comments seeds released mainly after death of adults

Deciduous/evergreen evergreen

Age of reproduction

sexual 4 years
asexual

Life span (years) long-lived (at least 15-20 years)

Seed

production yes, large
dispersal wind
viability declines only slightly in older follicles
germination reported to be poor in unburnt sites, situation in New Zealand unknown
seed bank probably does not enter seed bank

Vegetative reproduction

probably not

Comments

9. Browsers and parasites:

10. General facilitation:

introduced for hedging, and ornamental use, wind dispersal following fire

11. Contributors and Date of last revision:

P.A. Williams, Landcare Research, Nelson, December 1990
Colin C. Ogle, DOC, Wanganui, June 1992

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** hakea, downy
Formal name: *Hakea gibbosa*

2. **Illustration:**

3. **Impact on biota and ecosystem**

Plant -plant relationships

invades and crowds out gumland vegetation

Plant -animal relationships

unknown, but nectar source could be important for native invertebrates;
thorns may provide protection from predators for gecko (CCO)

Ecosystem

unknown, but non-woody vegetation completely changed

4. **Management:**

Hand control

cut stumps, hand pull seedlings

Mechanical

Chemical control

spray with 1% Roundup by knapsack or brushgun

Combination

in South Africa stands are cut, dried, then burnt; seedlings are pulled out
at a later stage; apply 20% Roundup to cut stump, frill or by injection

Biological control

Other

prevent fire

5. **Legislation:**

6. **References:**

much South African literature on this and other hakea species e.g. Richardson, D.M. et al. 1987: *Oecologia* 71: 345-354
Allo, A.V. 1959: Weeds with land development. *Proceedings of the 12th New Zealand Weed and Pest Control Conference*: 18-20.
Beever, R. 1988: Gumland scrub. *Auckland Botanical Society Journal* 43: 1-16.
Esler, A.E. 1962: Botanical features of Abel Tasman National Park. *Transactions of the Royal Society of New Zealand* 1(25): 297-311.
Esler, A.E., Rumball, P.J. 1975: Gumland vegetation at Kaikohe, Northland, New Zealand. *NZ Journal of Botany* 13: 425-436.
Fugler, S.R. 1983: The control of silky hakea in South Africa. *Bothalia* 14: 977-980.
Guillarmod, A.F.M.G.J. 1983: Recovery of Eastern Cape heathland after fire. *Bothalia* 14: 701-704.
Lee, H.M. 1984: The biology of *Hakea ulicina* R. Br. And *H. repullulans* (Proteaceae). *Australian Journal of Botany* 32: 679-699.

7. **Other sources of information and current projects:**

8. **Contributors and Date of last revision:**

P.A. Williams, Landcare Research, Nelson, December 1990

Colin C. Ogle, DOC, Wanganui, June 1992

additional information: Porteous, T. 1993: Native forest restoration. QEII National Trust, Wellington.

Hakea salicifolia willow-leaved hakea

TAXON SHEET

1. **Common name:** willow-leaved hakea
Family: Proteaceae
Formal name: *Hakea salicifolia*
Synonym:
 2. **Growth form:** small tree
 3. **Distribution:**
[abundance rating = low (l), medium (m), high (h) for present/potential infestation]

Northland-Auckland (l/m)
Bay of Plenty (l/m)
Wellington (l/l)
Nelson (l/l)
 4. **Habitat:** coastal, lowland
 5. **Communities:** low forest, scrub and forest margin, shrubland, fernland
 6. **Fertility:** low, confined to very poor soils
 7. **Response to environment:**

Response to
drought highly tolerant
shade slightly tolerant
frost slightly tolerant at adult stage
poor drainage intolerant

physical damage does not form base following damage
grazing unknown
fire (plants, seeds) killed by fire, but serotonous seed capsules (follicles) release viable seed
if fire not too severe

other
- Seedling requirements and tolerances
seedlings require bare ground, moderately shade tolerant
- Growth rates
seedlings does not produce annual rings so cannot be aged directly;
adults probably reaches 1m after 3-4 years
 probably reaches 4-5m after 10 years

8. Growth and reproduction:

Breeding system

flowering type monoecious
method of pollination insect
other comments produces masses of flowers and an early nectar source for bees and others

Life cycle

type perennial
flowering time August -November; September -October in Nelson
fruiting time always present, because follicles persist on tree
other comments seeds released mainly after death of adult

Deciduous/evergreen evergreen

Age of reproduction

sexual 4-5 years
asexual n/a

Life span (years) probably about 70-80 years maximum

Seed

production yes, c.25,00 seeds at 15-20 cm d.b.h.
dispersal gravity, wind
viability declines only slightly in older follicles
germination germinates readily in moist soil once released from follicles
seed bank no seed bank in the soil, seed bank is on trees; once released, the seeds either germinate or decay

Vegetative reproduction

none

Comments

absence of soil seed bank assists in eradication

9. Browsers and parasites:

seedlings are browsed by domestic stock in but otherwise unknown

10. General facilitation: planted as a hedge plant and ornamental, major spread has been through fires then wind dispersal; does not establish under its own canopy unless this is broken up by wind

11. Contributors and Date of last revision:

P.A. Williams, Landcare Research, Nelson, December 1990

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** willow-leaved hakea
Formal name: *Hakea salicifolia*
2. **Illustration:** Porteous, T. 1993: Native forest restoration. QEII National Trust, Wellington.
3. **Impact on biota and ecosystem**
replaces native species in early successional vegetation sequences; creates large gaps when falls because of dense crowns; succeeded by native species in c.60-70 years if no fires

Plant -plant relationships

unknown, but nectar source could be important for native species of invertebrates

Plant -animal relationships

unknown, but probably minimal

Ecosystem

4. **Management:**

Hand control pull seedlings

Mechanical

Chemical control Escort: spray, paint on stumps, or inject into stems; spray 1 % Roundup with knapsack or brushgun

Combination cut stumps with chainsaw and paint with Escort or 20% Roundup; frill or inject 20% Roundup

Biological control

Other in South Africa, stands are cut, dried, and then burnt; seedlings are pulled after a few months or whenever they are large enough to handle readily

5. **Legislation:** none
6. **References:** much South African literature on *Hakea* species, e.g. Richardson. D.M., Van Wilgan, B.W., Mitchell, D.T. 1987: *Oecologia* 71: 345-354.
Williams, P.A. 1992. *Hakea salicifolia*: biology and role in succession in Abel Tasman National Park, New Zealand. *Journal of the Royal Society of NZ* 22(1):1-18.
see references under downy hakea (*Hakea gibbosa*)
7. **Other sources of information and current projects:**
P.A. Williams, Landcare Research, Nelson, December 1990
8. **Contributors and Date of last revision:**
P.A. Williams, Landcare Research, Nelson, December 1990
additional information: Porteous, T. 1993 (see above)

Hakea sericea prickly hakea

TAXON SHEET

1. **Common name:** prickly hakea
Family: Proteaceae
Formal name: *Hakea sericea*
Synonym:
2. **Growth form:** shrub, small tree
3. **Distribution:**
[abundance rating = low (l), medium (m), high (h) for present/potential infestation]

North Auckland (m/h)
Auckland (l/m)
Bay of Plenty-Waikato (l/m)
Wellington (l/l)
Nelson/Marlborough (l/l)

4. **Habitat:** coastal, lowland
5. **Communities:** low forest, scrub and forest margin, shrubland
6. **Fertility:** low
7. **Response to environment:**

Response to

drought	highly tolerant
shade	slightly tolerant
frost	slightly tolerant
poor drainage	intolerant
physical damage	does not form from base, but once toppled, can revert to vertical shoot growth at ends of branches
grazing	unknown
fire (plants, seeds)	adults killed by fire, but serotonous seed capsules (follicles) release viable seed
other	

Seedling requirements and tolerances

seedlings require bare ground

Growth rates

seedlings	do not produce annual growth rings but probably reach 1 m after 3-4 years
adults	probably reach 3-4 m after 10 years

8. Growth and reproduction:

Breeding system

flowering type monoecious
method of pollination insect
other comments produces masses of flowers and an early nectar source for bees and other insects

Life cycle

type perennial
flowering time June -November; September -October in Nelson
fruiting time seeds always present, because follicles persist in trees
other comments seeds released mainly after death of adult trees

Deciduous/evergreen evergreen

Age of reproduction

sexual 4-5 years
asexual n/a

Life span (years) probably 30-40 years

Seed

production yes, abundant
dispersal gravity, wind
viability seeds remain viable on trees
germination high on burnt sites
seed bank seed bank is on trees; once released, seeds either germinate or decay

Vegetative reproduction

none

Comments

absence from soil seed bank assists in eradication

9. Browsers and parasites:

seedlings are browsed by domestic stock in NZ, but otherwise unknown

10. General facilitation: planted as a hedge plant, originally, but now spread by fire and wind; does not establish beneath its own canopy

11. Contributors and Date of last revision:

P.A. Williams, Landcare Research, Nelson, December 1990

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** prickly hakea
Formal name: *Hakea sericea*

2. **Illustration:**

3. **Impact on biota and ecosystem**
Medium

Plant -plant relationships

invades and crowds out gumland vegetation; replaces native species in early successional vegetation sequences; creates large gaps in vegetation when falls because of dense crown

Plant -animal relationships

unknown, but nectar source could be important for native species of invertebrates

Ecosystem

unknown, but non-woody vegetation completely changed

Other

4. **Management:**

Hand control

cut stumps, pull seedlings

Chemical control

Escort: spray, paint cut stumps, inject into stems; spray 1% Roundup; apply 20% Roundup to cut stumps, frill or by injection

Combination

in South Africa stands are cut, dried, then burnt; seedlings are pulled at a later date

Biological control

much work under investigation in South Africa

Other

fire control

5. **Legislation:** none

6. **References:**

much South African literature on *Hakea* species, e.g.
Richardson, D.M., Van Wilgen, B.W., Mitchell, D.T. 1987: *Oecologia* 71: 345-354
Williams, P.A. 1992. *Hakea sericea*: seed production and role in succession in Golden Bay, Nelson. *Journal of the Royal Society of NZ* 22(4): 307-320.
see references under downy hakea (*Hakea gibbosa*)

7. **Other sources of information and current projects:**

P.A. Williams, Landcare Research, Nelson, December 1990

8. **Contributors and Date of last revision:**

P.A. Williams, Landcare Research, Nelson, December 1990

additional information: Porteous, T. 1993: Native forest restoration. QEII National Trust, Wellington.

Hedera helix* subsp. *helix
ivy

TAXON SHEET

1. **Common name:** ivy
Family: Araliaceae
Formal name: *Hedera helix* subsp. *helix*
Synonym:
2. **Growth form:** climber
3. **Distribution:** scattered throughout North Island, Nelson. Canterbury, Marlborough, Otago, Halfmoon Bay
4. **Habitat:**
5. **Communities:**
6. **Fertility:**
7. **Response to environment:**

Response to

drought

shade

frost

semi-tolerant, establishes in light to moderate shade

poor drainage

physical damage

grazing

fire (plants, seeds)

other

Seedling requirements and tolerances

Growth rates

seedlings

adults

8. Growth and reproduction:

Breeding system

flowering type
method of pollination
other comments

Life cycle

type
flowering time March-May
fruiting time August-December
other comments

Deciduous/evergreen evergreen

Age of reproduction

sexual
asexual

Life span (years)

Seed

production
dispersal bird
viability
germination
seed bank

Vegetative reproduction

Comments

9. Browsers and parasites:

10. General facilitation: widely cultivated, often escaping and becoming established from vacant lots, cemeteries and deserted homes

11. Contributors and Date of last revision:

SMT, February 1994, compiled from: Flora of New Zealand volume IV

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** ivy
Formal name: *Hedera helix* subsp. *helix*

2. **Illustration:**

3. **Impact on biota and ecosystem**

Plant -plant relationships

can climb to the top of tall trees impacting epiphytic plants and forest canopy trees

Plant -animal relationships

poisonous

Ecosystem

potential to carpet forest floor, shrubs and tree trunks beneath a sparse forest canopy

Other

4. **Management:**

Hand control pull or dig out; mulch or compost

Mechanical

Chemical control spray with Escort at highest label rate plus Pulse

Combination cut stem and paint with Tordon

Biological control

Other

5. **Legislation:** none

6. **References:**

7. **Other sources of information and current projects:**

8. **Contributors and Date of last revision:**

SMT, February 1994, compiled from: Northland Conservancy DOC Weed Control Manual [no date]

Hedychium flavescens
yellow wild ginger

TAXON SHEET

1. **Common name:** yellow wild ginger
Family: Zingelbiraceae
Formal name: *Hedychium flavescens*
Synonym: *Hedychium subditum*
2. **Growth form:** herb
3. **Distribution:** Northern North Island
4. **Habitat:** coastal, lowland
5. **Communities:** scrub and forest margin
6. **Fertility:** moderate, high
7. **Response to environment:**

Response to

drought	slightly tolerant
shade	tolerates semi-shade but flowers best in open
frost	?
poor drainage	tolerant
physical damage	multiplies from rhizome pieces
grazing	
fire (plants, seeds)	
other	

Seedling requirements and tolerances

n/a

Growth rates

seedlings
adults

8. Growth and reproduction:

Breeding system

flowering type hermaphrodite sterile
method of pollination
other comments

Life cycle

type
flowering time March -April but recorded February -July in Auckland
fruiting time n/a
other comments

Deciduous/evergreen aerial stems deciduous

Age of reproduction

sexual
asexual

Life span (years) infinite

Seed

production does not seed
dispersal n/a
viability
germination
seed bank

Vegetative reproduction

vigorous by short, stout rhizomes

Comments

responds by putting on more growth after rhizome disturbance

9. Browsers and parasites:

10. General facilitation: dumping of garden refuse

11. Contributors and Date of last revision:

Alan Esler, Auckland, December 1990

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** yellow wild ginger
Formal name: *Hedychium flavescens*
2. **Illustration:** Porteous, T. 1993: Native forest restoration. QEII National Trust, Wellington.
3. **Impact on biota and ecosystem**
large

Plant -plant relationships
aggressive on forest margins and in shrubberies

Plant -animal relationships

Ecosystem smothering effect

Other
4. **Management:**

Hand control limited effectiveness; slash stems and dig out all rhizomes

Mechanical limited

Chemical control

Combination Escort + 25 gm per 100 L water + 0.1% Pulse: Roundup 2% + 0.2% Pulse

Biological control

Other
5. **Legislation:** unclassified
6. **References:** Rhodes, D. 1986: Wild ginger identification and control. *Protect* (Official Journal of the Noxious Weeds Inspectors' Institute Inc.) 7(5): 18-22.
7. **Other sources of information and current projects:**
8. **Contributors and Date of last revision:**
Alan Esler, Auckland, December 1990
Northland Conservancy DOC Weed Control Manual [no date]

Hedychium gardnerianum
wild ginger (kahili)

TAXON SHEET

1. **Common name:** wild ginger
Family: Zingiberaceae
Formal name: *Hedychium gardnerianum*
Synonym:
2. **Growth form:** herb
3. **Distribution:** Wellington to far north, uncommon in the South
4. **Habitat:** coastal, lowland
5. **Communities:** scrub and forest margin
6. **Fertility:** moderate, high
7. **Response to environment:**

Response to

drought	slightly tolerant
shade	tolerates moderate shade but flowers best in open?
frost	tolerant, flourishes on damp silt
poor drainage	

physical damage	multiplies from rhizome pieces
grazing	
fire (plants, seeds)	
other	

Seedling requirements and tolerances

semi-shade necessary

Growth rates

seedlings
adults

8. Growth and reproduction:

Breeding system

flowering type hermaphrodite
method of pollination
other comments

Life cycle

type perennial, clonal
flowering time (Jan) February -March
fruiting time March -May
other comments

Deciduous/evergreen aerial stems annual

Age of reproduction

sexual ?
asexual ?

Life span (years) infinite

Seed

production yes
dispersal vertebrates
viability
germination
seed bank

Vegetative reproduction

vigorous by short stout rhizomes

Comments

9. Browsers and parasites:

10. General facilitation: seed dispersal by birds, dumping of garden refuse

11. Contributors and Date of last revision:

Alan Esler, Auckland, December 1990

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** wild ginger (kahili)
Formal name: *Hedychium gardnerianum*
2. **Illustration:** Northland Conservancy DOC Weed Control Manual [no date].
Porteous, T. 1993: Native forest restoration. QEII National Trust, Wellington.
3. **Impact on biota and ecosystem**
large

Plant -plant relationships
aggressive on forest margins and in shrubberies

Plant -animal relationships
tuis feed on arils

Ecosystem
forms vast colonies, smothering effect on forest floor; may permanently displace uncommon plants or specialised communities

Other
kahili spreads relatively slowly so systematic eradication is possible over quite large areas
4. **Management:**

Hand control
pull small seedlings, do not leave rhizomes to mulch; removal of all flower heads slows down the spread

Mechanical
grub isolated small plants, dig out all rhizomes

Chemical control
Escort 25 gm per 100 L water + 0.1% Pulse; Roundup 2% + 0.2% Pulse; Amitrole

Combination

Biological control

Other
5. **Legislation:** unclassified
6. **References:** Rhodes, D. 1986: Wild ginger identification and control. *Protect* (Official Journal of the Noxious Weeds Inspectors' Institute Inc.) 7(5): 18-22.
7. **Other sources of information and current projects:**
8. **Contributors and Date of last revision:**
Alan Esler, Auckland, December 1990
Northland Conservancy DOC Weed Control Manual [no date]

Hieracium pilosella mouse-ear hawkweed

TAXON SHEET

1. **Common name:** mouse-ear hawkweed
Family: Asteraceae
Formal name: *Hieracium pilosella*
Synonym: *Pilosella officinarum*
2. **Growth form:** herb
3. **Distribution:**
[abundance rating = low (l), medium (m), high (h) for present/potential infestation]

South Island high country (h/h)
South Island low country (l/l)
North Island (l/l)
Bay of Plenty (l)
East Cape/Hawkes Bay Ranges (m)
Marlborough (h)
Canterbury (m/h)
Westland (l)
Otago/Southland (m/h)
4. **Habitat:** lowland, montane, subalpine
5. **Communities:** shrubland, tall tussockland, short tussockland, cliff, bluff, riverbed, herbfield
6. **Fertility:** low-moderate, but there is an implication that it prefers moderate conditions
7. **Response to environment:**

Response to
drought tolerant
shade intolerant
frost highly tolerant
poor drainage slightly tolerant

physical damage highly tolerant; removal of apical dominance activates dormant stolons
grazing highly tolerant
fire (plants, seeds) n/a, hawkweed stands not likely to carry fire although fire may reduce competition from other species and allow it to increase its dominance
other
- Seedling requirements and tolerances
moist warm conditions immediately after seed set; establishment from seed relatively unimportant
- Growth rates
seedlings rapid in right conditions -but very very rare
adults 0-15 new rosettes per year

8. Growth and reproduction:

Breeding system sexual or NZ material probably apomictic
flowering type hermaphrodite
method of pollination insect (Lepidoptera)
other comments provides some pollen for bees though clover is preferred by apiarists

Life cycle

type perennial with clonal spread by stolons: 99% or more of new rosettes come from clonal spread
flowering time late November -mid January / October -February (May)
fruiting time mid December -January / November -April (May)
other comments

Deciduous/evergreen evergreen though most leaves die off

Age of reproduction

sexual 1 year
asexual 1 year

Life span (years) flowering rosettes die, non flowering rosettes: 10-20 years

Seed

production yes, prolific approximately 1000/dm²
dispersal gravity, wind
viability initially high but drops rapidly -probably only after a few months
germination wet autumns following from flowering
seed bank probably no seed bank

Vegetative reproduction

stolons give rise to 0-15 new rosettes per year

Comments

3 subspecies have slightly different ecological requirements and reproductive abilities apparently (PG-J)

9. Browsers and parasites:

none known; occasionally a general seed feeder observed

10. General facilitation: wind dispersion of seeds

11. Contributors and Date of last revision:

T.A. Jenkins for D. Scott, Horticultural Research, Christchurch, January 1991
Phil Garnock-Jones, Landcare Research, Christchurch, December 1990

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** mouse-ear hawkweed
Formal name: *Hieracium pilosella*

2. **Illustration:** Wilson H 1978: Wild Plants of Mount Cook National Park. Field Guide Publications, Christchurch. p158

3. **Impact on biota and ecosystem**
Plant -plant relationships
very large effect; competitive exclusion of native and other species from short tussock grasslands; continuing to spread to tall tussock grassland zone; probably establishes in vegetation (e.g. tussock) and then spreads

Plant -animal relationships
although a preferred grazing species, its low habit and exclusion of other species limits feed available; probably has no direct deleterious effect on animals in a native system

Ecosystem
competitive exclusion and depletion of flora, consequently fauna and nutrient condition of the tussock grassland zone depressed

Other
has no economic or soil value of significance

4. **Management:**
Hand control
not practical, ineffective

Mechanical
not practical, ineffective; if anything mechanical control has more of an effect on other plants allowing hawkweed a greater competitive advantage

Chemical control
control generally resistant to most herbicides; best control with 2, 4 D ester at 1 to 2 kg/ha or a mecoprop/MCPA/diacamba formulation at 1.5 to 3 kg/ha; unconfirmed reports that Roundup at 4 to 6 L/ha plus surfactant is effective; Escort apparently ineffective

Combination

Biological control
control preliminary work carried out on fungal BCA's but these are not introduced yet (Horticultural Research work); work on insect options proposed (Landcare Research); Pauline Syrett, Hieracium Control Trust, Miklos Sarospataki, PhD student, Hungary, Colin Meurk, Landcare-simulating biocontrol; David Scott, AgResearch, Tim Jenkins, PhD - mouse-ear hawkweed rust.

Other
on better soils, fertilisation and oversowing with white clover and alsike clover can substantially reduce mouse-ear hawkweed as a pastoral or animal-feed problem

5. **Legislation:** none

6. References:

- Grundy T.P. 1989: An economic evaluation of biological control of *Hieracium*. Research Report Agriculture business and Economics Research Unit, Lincoln College 202.
- Hunter. G.G. Mason. C.R., D.M. 1992: Vegetation change in grasslands, with emphasis on hawkweeds. *NZ Ecological Society Occasional Publication 2*.
- Makepeace, W. 1985: Growth, reproduction, and production biology of mouse-ear and king devil hawkweed in eastern South Island. *NZ Journal of Botany 23*: 65-78.
- Makepeace, W. 1985: Some establishment characteristics of mouse-ear and king devil hawkweeds. *NZ Journal of Botany 23*: 91-100.
- Makepeace, W., Dobson, A.T., Scott, A.T. 1985: interference phenomena due to mouse-ear and king devil hawkweed. *NZ Journal of Botany 23*: 79-80.
- Scott, D. 1984: Hawkweeds in run country. *Tussock Grasslands and Mountain Lands Institute Review 42*: 33-47.
- 1991: three papers on hawkweeds in Tussock Grasslands and Mountain Lands Institute Review 48: 8-40.

7. Other sources of information and current projects:

Hieracium Trust Harris, -effects of fertiliser on spread; Roz Buick, Landcare - computer database on stock and pest management; Landcare Research-management practices for farmers to reduce rate of invasion and spread

8. Contributors and Date of last revision:

T.A. Jenkins for D. Scott, Horticultural Research, Christchurch, January 1991
Phil Garnock-Jones, Victoria University of Wellington, December 1990

Hieracium praealtum
king devil

TAXON SHEET

1. **Common name:** king devil
Family: Asteraceae
Formal name: *Hieracium praealtum*
Synonym: *Pilosella praealta*

2. **Growth form:** herb

3. **Distribution:**
[abundance rating = low (l), medium (m), high (h) for present/potential infestation]

Volcanic Plateau (l)
Nelson (Glenhope) (l)
Marlborough (Mt Richmond) (l)
Canterbury (m/h)
Westland (l)
Otago (m/h)
South Island high country, grazed areas (l), and ungrazed areas (m)

4. **Habitat:** lowland, montane, subalpine

5. **Communities:** shrubland, tall tussockland, short tussockland, riverbed

6. **Fertility:** low

7. **Response to environment:**

Response to

drought	highly tolerant
shade	intolerant
frost	highly tolerant
poor drainage	tolerant

physical damage	highly tolerant (removal of apical dominance activates dormant stolons)
grazing	intolerant
fire (plants, seeds)	n/a
other	

Seedling requirements and tolerances

moist warm conditions immediately after seed set; establishment from seed is relatively unimportant

Growth rates

seedlings	rapid in right conditions -but very rare
adults	0-15 new rosettes per year

8. Growth and reproduction:

Breeding system sexual or partly apomictic
flowering type hermaphrodite
method of pollination insect (Lepidoptera)
other comments

Life cycle
type perennial with clonal spread by stolons
flowering time late November -mid January / (Sep) November - March (Apr)
fruiting time mid December -January / (Sep) November - March (Apr)
other comments

Deciduous/evergreen evergreen though most leaves die off

Age of reproduction
sexual 1 year
asexual 1 year

Life span (years) expected 5-10 years

Seed
production yes, prolific approximately 1000/dm²
dispersal wind
viability initially high but drops rapidly -probably only after a few months
germination wet autumns following from flowering, well defined light requirement
seed bank prior to germination
probably no seed bank

Vegetative reproduction
stolons give rise to 0-15 new rosettes per year

Comments

9. Browsers and parasites:

none known; occasionally a general seed feeder observed

10. General facilitation: wind dispersion of seeds

11. Contributors and Date of last revision:

T.A. Jenkins for D. Scott, Horticultural Research, Christchurch, January 1991
Phil Garnock-Jones, Landcare Research, Christchurch, December 1990

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** king devil
Formal name: *Hieracium praealtum*
2. **Illustration:** Wilson, H. 1978: Wild Plants of Mount Cook National Park. Field Guide Publications, Christchurch, p.159.
3. **Impact on biota and ecosystem**
 - Plant -plant relationships
very large impact because of competitive exclusion; probably a bare ground coloniser rather than establishing in existing vegetation sward
 - Plant -animal relationships
small; more upright habit compared to *Hieracium pilosella* results in vulnerability to grazing
 - Ecosystem
very large impact; reduction in flora and fauna and nutrient condition in tussock grasslands; major problem in reserves and other areas where there is no grazing
 - Other
no economic and no significant conservation value
4. **Management:**
 - Hand control
not practical, ineffective
 - Mechanical
not practical, ineffective
 - Chemical control
suspect similarities with *Hieracium pilosella*
 - Combination
 - Biological control
grazing; preliminary work on fungal BCA'S (Horticultural Research); no introductions yet; proposals for insect BCA's (Landcare Research)
5. **Legislation:** not declared noxious
6. **References:**

Hunter, G.G. Mason, C.R., D.M. 1992: Vegetation change in grasslands, with emphasis on hawkweeds. *NZ Ecological Society Occasional Publication 2*.
Institute of Noxious Plant Officers, 1989: Conference and Training Seminar (Timaru) p97-103 *Hieracium*, by Dr. Scott.
Makepeace, W. 1985: Some establishment characteristics of mouse-ear and king devil hawkweeds. *NZ Journal of Botany 23*: 91-100.
1991: three papers on hawkweeds in Tussock Grasslands and Mountain Lands Institute Review 48: 8-40.
Scott, D. 1984: Hawkweeds in run country. *Tussock Grasslands and Mountain Lands Institute Review 42*: 33-47.
7. **Other sources of information and current projects:**

D. Scott, Horticultural Research Project
8. **Contributors and Date of last revision:**

T.A. Jenkins for D. Scott, Horticultural Research, Christchurch, January 1991
P. Garnock-Jones, Landcare Research, Christchurch, December 1990

Chysanthemoides monilifera
bone-seed

TAXON SHEET

1. **Common name:** hydrilla
Family: Hydrocharitaceae
Formal name: *Hydrilla verticillata* (L.f.) Royle
Synonym:
2. **Growth form:** herb, submerged macrophyte
3. **Distribution:**
[abundance rating = low (l), medium (m), high (h) for present/potential infestation]

Hawkes Bay (l/m)
potentially (h) in fresh-water bodies throughout NZ

4. **Habitat:** coastal, lowland, montane
5. **Communities:** wetland, any water body
6. **Fertility:** low, low- moderate, moderate, high
7. **Response to environment:**

Response to

drought
shade
frost
poor drainage

physical damage resprouts from broken branches, grows from fragments; regrowth from rhizomes, tubers and turions

grazing resprouts from broken branches, grows from fragments; regrowth from rhizomes, tubers and turions

fire (plants, seeds)

other

Seedling requirements and tolerances

asexual reproduction in NZ only male plants; fragments can establish in native and *Elodea* communities eventually excluding them

Growth rates

seedlings 1 m²/yr in Lake Oponaki
adults

8. Growth and reproduction:

Breeding system dioecious, only male in NZ
flowering type
method of pollination
other comments

Life cycle
type perennial
flowering time January-February
fruiting time
other comments

Deciduous/evergreen evergreen

Age of reproduction
sexual
asexual almost immediate

Life span (years) many years

Seed
production no
dispersal
viability
germination
seed bank

Vegetative reproduction
turions, tubers produced; any broken fragments will, or have potential to, form new plants

Comments

9. Browsers and parasites:

wildfowl e.g. black swan, mallard

10. General facilitation: contamination of water craft, eel fyke nets, deliberate introduction to other water bodies

11. Contributors and Date of last revision:

P.D. Champion, NIWA, Hamilton, January 1991

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** hydrilla
Formal name: *Hydrilla verticillata* (L.f.) Royle
2. **Illustration:** Aston, H.I. 1973: Aquatic Plants of Australia. Melbourne University Press.
3. **Impact on biota and ecosystem**
very large

Plant -plant relationships
displaces all other submerged macrophytes from approximately 1.5-5 m depth

Plant -animal relationships
provides food for wildfowl especially black swan; dense growths probably a nursery for fish and food for invertebrates

Ecosystem
when established hydrilla forms a monospecific bed

Other
4. **Management:**

Hand control
hand weeding -using SCUBA carefully remove plants including all rhizome material; only useful on small (1-2 stalk) plants

Mechanical
suction dredging -using venturi pump, yet to be trialled
bottom lining - cover infestations with Weed Mat, apparently successful

Chemical control
diquat (gel formulation) 40 L/ha applied in autumn by knapsack sprayer was totally ineffective; trials at MAF Ruakura using range of other herbicides e.g. bensulfuron, dichlobenil, Sonar carried out 1991-92

Combination

Biological control
sterile grass carp, triploid fish, trialled at Elands Lake (100 fish/ha) September 1988; all trace of hydrilla removed (November 1990); seems to be best and probably only eradication option
5. **Legislation:** not declared a Class B target noxious plant for Hawkes Bay but included in list of aquatic plants restricted from sale, distribution and propagation NZ Gazette No. 89 p.2489 (1986)
6. **References:** many USA and Australian
7. **Other sources of information and current projects:**
Aquatic Plant Section, MAF Quality Management, Ruakura Agricultural Centre, Private Bag, Hamilton
MAF Technology, Quality Management and Fisheries joint project (funded by NPC) grass carp trial at Elands Lake
MAF Technology, Quality Management and Department of Conservation (Hawkes Bay) mechanical options trial at Lake Opouati
8. **Contributors and Date of last revision:**
P.D. Champion, NIWA, Hamilton, January 1991

Hydrodictyon reticulatum water net

TAXON SHEET

1. **Common name:** water net
Family:
Formal name: *Hydrodictyon reticulatum*
Synonym:
2. **Growth form:** free-flowing filamentous alga
3. **Distribution:** Lakes Rotorua and Rotoiti, Hamurana Springs, Kaituna River, East Coast Waterways from Tauranga to Whakatane
4. **Habitat:** lowland
5. **Communities:** freshwater bodies
6. **Fertility:** prefers neutral to acid waters
7. **Response to environment:**

Response to

drought
shade
frost
poor drainage

physical damage
grazing
fire (plants, seeds)
other

Seedling requirements and tolerances

Growth rates

seedlings
adults

8. Growth and reproduction:

Breeding system

flowering type
method of pollination
other comments

Life cycle

type
flowering time
fruiting time
other comments

produces spores in unfavourable conditions; these fuse to form
hypnosporangia which is very resistant to drying and can germinate once
conditions are favourable

Deciduous/evergreen

Age of reproduction

sexual
asexual

Life span (years)

Seed

production
dispersal
viability
germination
seed bank

Vegetative reproduction

yes, rapid

Comments

9. Browsers and parasites:

10. General facilitation:

probably originally introduced unintentionally with tropical fish; spread
between water bodies by wildfowl or insects or by human activity,
particularly boating

11. Contributors and Date of last revision:

SMT, February 1994, compiled from Water net pamphlet: Clayton *et al.*
1991 (see reference next page)

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** water net
Formal name: *Hydrodictyon reticulatum*
2. **Illustration:**
3. **Impact on biota and ecosystem**
 - Plant -plant relationships
may smother rooted aquatic plants
 - Plant -animal relationships
loss of habitat for fish, waterfowl and other water life
 - Ecosystem
excessive growth of water net causes odours, taste problems with water, clogging or irrigation ditches, nuisance for recreational activities
4. **Management:**
 - Hand control
 - Mechanical
mechanical harvester, suction vacuum
 - Chemical control
 - Combination
 - Biological control
 - Other
not possible to eradicate from New Zealand waters; restrict transport of water net to new sites
5. **Legislation:**
6. **References:**

Water net. The new threat to New Zealand's fresh waters. Pamphlet prepared by DSIR, MAF, Electricorp, BOP Regional Council, Waikato Regional Council, Taupo District Council.

Clayton, J., Wells, R., Howard-Williams, C., Hawes, I. 1991: Position paper on the newly introduced nuisance aquatic weed *Hydrodictyon reticulatum* (water net). Aquatic Plant Section, MAF Technology, Ruakura and Taupo Research Laboratory, DSIR Marine and Freshwater.
7. **Other sources of information and current projects:**
8. **Contributors and Date of last revision:**

SMT, February 1994, compiled from Water net pamphlet: Clayton *et al.* 1991 (see reference next page)

Iris foetidissima
stinking iris

TAXON SHEET

1. **Common name:** stinking iris
Family: Iridaceae
Formal name: *Iris foetidissima*
Synonym:
2. **Growth form:** herb
3. **Distribution:** throughout North Island, almost throughout South Island, but not known from Westland, Fiordland, and Southland; varying in extent from scattered colonies to large dense troublesome communities
4. **Habitat:** coastal, lowland
5. **Communities:** low forest, scrub and forest margin, waste places
6. **Fertility:**
7. **Response to environment:**

Response to

drought	prefers high rainfall
shade	highly tolerant; prefers shade
frost	
poor drainage	

physical damage	
grazing	resprout from rhizome
fire (plants, seeds)	
other	

Seedling requirements and tolerances

Growth rates

seedlings
adults

8. Growth and reproduction:

Breeding system

flowering type

method of pollination

other comments

Life cycle

type

flowering time November -December

fruiting time late summer

other comments

Deciduous/evergreen evergreen

Age of reproduction

sexual

asexual

Life span (years)

Seed

production yes

dispersal birds, water

viability

germination

seed bank

Vegetative reproduction

yes, rhizomatous

Comments

9. Browsers and parasites:

- 10. General facilitation:** spreads from infestations in gullies or older gardens, seeds dispersed by birds and fans with portions of rhizome attached may be carried by streams

11. Contributors and Date of last revision:

SMT, February 1994, compiled from Flora of New Zealand volume III

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** stinking iris
Formal name: *Iris foetidissima*
2. **Illustration:** Porteous, T. 1993: Native forest restoration. QEII National Trust. Wellington.
3. **Impact on biota and ecosystem**
 - Plant -plant relationships
displaces native shrubs and ground cover in forest remnants
 - Plant -animal relationships
unpalatable, toxic to livestock; leaf gives an unpleasant when broken
 - Ecosystem
dense stands in forest remnants, prevent natural regeneration
 - Other
4. **Management:**
 - Hand control
 - Mechanical
 - Chemical control Grazon 1% knapsack, apply while actively growing
 - Combination
 - Biological control
 - Other
5. **Legislation:**
6. **References:**
7. **Other sources of information and current projects:**
8. **Contributors and Date of last revision:**
SMT, February 1994, compiled from Porteous, T. 1993 (see above)

Lagarosiphon major lagarosiphon

TAXON SHEET

1. **Common name:** lagarosiphon
Family: Hydrocharitaceae
Formal name: *Lagarosiphon major* (Ridley) Wager
Synonym:
2. **Growth form:** herb, submerged macrophyte
3. **Distribution:**
[abundance rating = low (l), medium (m), high (h) for present/potential infestation]

North Island (h/h)
South Island (l-m/h)
4. **Habitat:** coastal, lowland, montane
5. **Communities:** wetland (any freshwater body)
6. **Fertility:** low, low-moderate, moderate, high
7. **Response to environment:**

Response to

drought
shade
frost
poor drainage

physical damage	resprouts from branches, grows from fragments
grazing	resprouts from branches, grows from fragments
fire (plants, seeds)	
other	

Seedling requirements and tolerances

asexual reproduction in NZ, only female plants

Growth rates

seedlings	very rapid
adults	very rapid

8. Growth and reproduction:

Breeding system dioecious, only female in NZ
flowering type
method of pollination
other comments

Life cycle
type perennial
flowering time December -April
fruiting time
other comments

Deciduous/evergreen evergreen

Age of reproduction
sexual
asexual almost immediate

Life span (years) many years

Seed
production no
dispersal
viability
germination
seed bank

Vegetative reproduction
fragmentation forming new plants

Comments

9. Browsers and parasites:

wildfowl

10. General facilitation:

contamination of watercraft, eel fyke nets, deliberate introduction into new waterbodies, flooding, discarded aquaria contents

11. Contributors and Date of last revision:

P.D. Champion, NIWA, Hamilton, January 1991

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** lagarosiphon
Formal name: *Lagarosiphon major* (Ridley) Wager
2. **Illustration:** Healy, A.J., Edgar, E. 1980: Flora of New Zealand volume III, p28.
3. **Impact on biota and ecosystem**
very large

Plant -plant relationships
displaces all other submerged macrophytes from approximately 1-6 m depth

Plant -animal relationships

Ecosystem produces a tall monospecific bed on many occasions
4. **Management:**

Hand control handweeding

Mechanical suction dredging
bottom lining

Chemical control diquat (gel) 40 L/ha applied in autumn gives up to 12 months control if applied in clear water conditions

Combination

Biological control grass carp not trialled on lagarosiphon but would provide best eradication option

Other
5. **Legislation:** restricted from sale, distribution and propagation Gazette No. 89 p. 2489 (1986); Class B Target in Lake District, Class B Widespread in Strathallen, Tuapeka, Waitaki, Southland District (or their new equivalents)
6. **References:** Howard-Williams, C., Davies, J. 1988: The invasion of Lake Taupo by the submerged water weed *Lagarosiphon major* and its impact on the native flora. *NZ Journal of Ecology* 11: 13-19
7. **Other sources of information and current projects:**
large database on water weeds at Aquatic Plant Section, Ruakura Agricultural Centre, MAF Quality Mangement, Private Bag, Hamilton
8. **Contributors and Date of last revision:**
P.D. Champion, NIWA, Hamilton, January 1991

Larix decidua European larch

TAXON SHEET

1. **Common name:** European larch
Family: Pinaceae
Formal name: *Larix decidua* Miller
Synonym:
 2. **Growth form:** large tree
 3. **Distribution:**
[abundance rating = low (l), medium (m), high (h) for present/potential infestation]

Clarence (l/m)
MacKenzie Basin (l/l)
Hanmer Springs (l/l)
Queenstown area (l/l)
Skippers (h/h)
 4. **Habitat:** montane, subalpine
 5. **Communities:** tall tussockland, short tussockland
 6. **Fertility:** low
 7. **Response to environment:**

Response to
drought slightly intolerant
shade tolerant of partial shade, intolerant of dense shade in establishment
frost intolerant at time of spring flush
poor drainage intolerant

physical damage regrowth if some green foliage remains
grazing
fire (plants, seeds) fire can kill plants less than 2 m, but can create a good seedbed for fresh seed to establish
other can grow in harsh conditions where land is not intensively grazed or oversown and topdressed
- Seedling requirements and tolerances
- Growth rates
seedlings height growth 0.5-1 m/year for the first 5-6 years
adults stand volume increment in the Canterbury high-country 10-20 m³/ha/year

8. Growth and reproduction:

Breeding system

flowering type monoecious
method of pollination wind
other comments

Life cycle

type perennial
flowering time pollen produced late September -early October
fruiting time March -June
other comments cone matures in 6-7 months; usually some cones produced every year;
good crops irregularly at 2-4 year intervals

Deciduous/evergreen deciduous

Age of reproduction

sexual major seed after 12 years -much later in areas with rainfalls greater than
1,000 mm
asexual

Life span (years) greater than 80 years

Seed

production yes, 0.8-2.5 kg seed/hectolitre of cones; 130,000-170,000 seeds/kg of
cones
dispersal wind
viability 20-60% germination expected
germination 20-60% germination expected, spring
seed bank delayed germination still occurring after 4 years on dry highcountry site;
seed remains viable if stored 3-5 years in a dry store at 4°C

Vegetative reproduction

Comments

9. Browsers and parasites:

sheep, hares, rabbits and possums ringbark trees in the crown

- 10. General facilitation:** seed is small and winged and easily spread by wind - often a single larch seedling is found a considerable distance from the seed source, whereas with most other conifer species windings are generably found closer to the parent trees; take off sites (exposed ridges and slopes) are a common source of distant outliers

11. Contributors and Date of last revision:

Lisa Langer (previously Crozier), NZ FRI, Christchurch, January 1991
Nick Ledgard, NZ FRI, Christchurch, January 1991

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** European larch
Formal name: *Larix decidua* Miller
2. **Illustration:** Dallimore and Jackson 1976: Handbook of Coniferae.
Miller and Knowles 1988: *FRI Bulletin 124* (see below)
3. **Impact on biota and ecosystem**
large

Plant -plant relationships

affect tussock grasslands and highcountry land which is not intensively grazed or oversown and topdressed regularly; often spread occurs as isolated trees, so less native vegetation is smothered than where dense tree spread occurs

Plant -animal relationships

reasonably palatable to sheep

Ecosystem

deciduous nature means light penetration through canopy and therefore conducive to understory invasion

4. **Management:**

Hand control

recommended for seedlings smaller than 0.5 m tall

Mechanical

fell with handtools, scrubcutters and chainsaws removing all green foliage

Chemical control

spray with glyphosate or mitsulfuron, or apply picloram in the summer; see Chemical Control Sheet for details

Combination

untested, though application of XL, Roundup or may produce reasonable mortality levels if applied to cut stump with only one whorl of live branches

Other

grazing remains cheapest and most common management control technique

5. **Legislation:** none

6. **References:**

Crozier, E.R. 1990: Chemical control of wilding conifers. *Proceedings NZ Weed and Pest Control Conference*. Pp. 182-186.
Crozier, E.R. and Ledgard, N.J. 1990: Palatability of wilding conifers and control by simulated browsing. *FRI Bulletin 155*. Pp. 139-143.
Miller, J.T. and Knowles, F.B. 1988: Introduced forest trees in New Zealand: Recognition, role and seed source. 3. The larches *Larix decidua* Miller, *Larix kaempferi* (Lambert) carr. *Larix eurolepis* A. Henry. *FRI Bulletin*.

7. **Other sources of information and current projects:**

8. **Contributors and Date of last revision:**

Lisa Langer (previously Crozier), NZ FRI, Christchurch, January 1991
Nick Ledgard, NZ FRI, Christchurch, January 1991

CHEMICAL CONTROL SHEET

Weed species common name: European larch

User & Location	Chemical	Application Rate	Method of Application	Season of Application	Periodicity	Success Rating
Lisa Langer NZFRI, Christchurch	Roundup	3.6 g glyphosate+ 5 ml Silwet L-77	knapsack	December		95% kill
	“	“	knapsack	July		25% kill
	Tordon 2G	1 g picloram granules/tree	knapsack	December		100% kill
	Escort	0.15 g mitsulfuron +5 ml Silwet L-77	knapsack	December		95% kill
	“	“	knapsack	July		20% kill
	Grazon	1.8 g triclopyr (Grazon)	knapsack	December July		50% kill 15% kill
	2, 4-D	7.2 g 2,4 D +200 ml Diesel +3 ml Triton X45	knapsack	December July		20% kill 30% kill

8. Growth and reproduction:

Breeding system

flowering type December -May
method of pollination
other comments

Life cycle

type
flowering time
fruiting time
other comments

Deciduous/evergreen

Age of reproduction

sexual
asexual

Life span (years)

Seed

production abundant
dispersal water, bird
viability
germination
seed bank

Vegetative reproduction

Comments

9. Browsers and parasites:

10. General facilitation:

11. Contributors and Date of last revision:

SMT, January 1994, compiled from: Flora of New Zealand volume IV

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** Himalayan honeysuckle
Formal name: *Leycesteria formosa*
2. **Illustration:** Upritchard, E.A. 1985: A guide to the identification of New Zealand common weeds in colour. New Zealand Weed & Pest Control Society, Hastings.
Porteous, T. 1993: Native forest restoration. QEII National Trust, Wellington.
3. **Impact on biota and ecosystem**
 - Plant -plant relationships
can hinder regeneration of indigenous species
 - Plant -animal relationships
possibly poisonous
 - Ecosystem
common in cutover forest but can also penetrate deeply into untouched forest via natural light gaps e.g. windfalls, streamsides forming dense thickets
 - Other
4. **Management:**
 - Hand control
dig out, leave to rot
 - Mechanical
 - Chemical control
Grazon 0.6% knapsack; Tordon 2G 55 gm/m² ground covered by dripline of plant; Tordon Brushkiller 0.6%; Escort 35 g + 100 mls Pulse/100 L water, handgun or 5 g + 10 mls Pulse/10 L water knapsack; 1% Roundup
 - Combination
 - Biological control
 - Other
5. **Legislation:** none
6. **References:**
7. **Other sources of information and current projects:**
8. **Contributors and Date of last revision:**
SMT, January 1994, compiled from: Northland Conservancy DOC Weed Control Manual [no date]

Ligustrum lucidum
tree privet

TAXON SHEET

1. **Common name:** tree privet
Family: Oleaceae
Formal name: *Ligustrum lucidum* Aiton f.
Synonym:

2. **Growth form:** large tree

3. **Distribution:**
[abundance rating = low (l), medium (m), high (h) for present/potential infestation]

Auckland (h/h)
Northland (?/h?)
Waikato (?/h?)
Bay of Plenty (?/h?)
Coromandel (?/h?)

4. **Habitat:** coastal, lowland

5. **Communities:** scrub and forest margin, roadsides, fencelines, open forest

6. **Fertility:** low, low-moderate, moderate, high

7. **Response to environment:**

Response to
drought slightly tolerant
shade tolerant
frost not known -possibly intolerant
poor drainage possibly intolerant

physical damage resprouts readily
grazing leaves poisonous to stock (Cornwell 1990)
fire (plants, seeds) unknown
other some plants can sustain large populations of passion vine hopper (*Scolytopa australis*) with little ill-effect

- Seedling requirements and tolerances
seeds need to be removed from berry to germinate; optimum germination temperature 15°C; seeds can germinate in total darkness

- Growth rates
seedlings c.32-54 cm/year -this is probably a conservative estimate
adults resprouts from branch segments growing in sand: up to 95 cm/year
resprouts from cut stumps: up to 2 m/year

8. Growth and reproduction:

Breeding system

flowering type bisexual
method of pollination insect
other comments flowers produce nectar and strong perfume - -may be irritant to some people producing hay fever type symptoms

Life cycle

type perennial, trees may have more than one stem, life may be prolonged by suckers sent up by senescent stem
flowering time November - March
fruiting time February/March - August
other comments

Deciduous/evergreen evergreen

Age of reproduction

sexual unknown -may depend on light conditions
asexual unknown -size may be more important than age

Life span (years)

unknown -oldest trees in New Zealand are c.100 years; as older stems die, regrowth appears so potentially long lived

Seed

production yes, canopy tree (39 cm diam.) in Auckland Domain produced an estimated 2.6 million seeds in 1989 season
dispersal gravity, vertebrates
viability initially moderate (c.50% freshly picked), dropping off rapidly, some seeds surviving for 2 years or more in the soil
germination germination highest when seeds fresh i.e. June-July; optimum germination temperature is 15°C (Burrows and Kohen 1983)
seed bank seed dormant in soil up to 2 years, possibly longer

Vegetative reproduction

regenerated from branch segments in glasshouse, not known if this is possible in the wild; suckers

Comments

9. Browsers and parasites:

passion vine hoppers (*Scolypopa australis* - Hemiptera)

10. General facilitation: bird dispersed seed

11. Contributors and Date of last revision:

Mel Norris (formerly van Aalst), University of Auckland, March 1991

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** tree privet
Formal name: *Ligustrum lucidum* Aiton f.
2. **Illustration:** Goulding, J.H. 1973: Privets. *Annual Journal of the Royal NZ Institute of Horticulture* 1: 45-48
3. **Impact on biota and ecosystem**
 - Plant -plant relationships

forest margins, scrub, gardens, open forests; invades, grows quickly, shading other plants out -takes over
 - Plant -animal relationships

food source for birds including blackbird (*Turdus merula*), starling (*Sturnus vulgaris*), waxeye (*Zosterops lateralis*), possibly tui (*Prosthemadera novaeseelandiae*); heavily predated by passion vine hoppers in summer
 - Ecosystem

completely dominates areas which it invades
 - Other

pollen allergenic and/or perfume strongly irritant (this more likely) to some people
4. **Management:**
 - Hand control

cut tree down; stump produces abundant regrowth in most cases
 - Mechanical

felled and chipped by City Council in Orakei Basin in 1986 with only a 10% kill rate but the privet chips provided an ideal mulch for growing native species, especially vines
 - Chemical control

see Chemical Control Sheet
 - Combination

cut down tree and paint stump; make shallow cuts around stump and swab area with suitable herbicide within 10-15 minutes of cutting
5. **Legislation:** deferred
6. **References:**

Burrows, F.J. and Kohen, J. 1983: Germination of *Ligustrum lucidum* W.T. Ait and *L. sinense* Lour. at different temperatures. *Australian Weeds* 2(4): 130-132.
Burrows, F.J. and Kohen, J. 1986: Inhibition of germination in privet. *Plant Protection Quarterly* 1: 107-108.
Cornwell, M.J. 1990. Control of certain environmentally sensitive weeds in forests, reserves and roadsides. *NZ Institute of Noxious Plants Officers Inc. Conference Proceedings 1990*. Pp. 87-90.
Goulding, J.H. 1973. Privets. *Annual Journal of the Royal NZ Institute of Horticulture* 1: 45-48.
James, T.K. and Mortimer, J. 1984: Control of privet. *Proceedings of the 37th NZ Weed and Pest Control Conference*. Pp. 206-209.
Mathews, G.R. 1990. Privet in NSW. *NZ Institute of Noxious Plants Officers Inc. Conference Proceedings 1990*. Pp. 139-142.
Westoby, M., Dalby, J. and Adams-Acton, L. 1983: Fruit production by two species of privet, *Ligustrum sinense* Lour, and *L. lucidum* W.T. Ait., in Sydney. *Australian Weeds* 2: 127-129.
7. **Other sources of information and current projects:**

van Aalst, M.M. 1992: Aspects of the Regeneration Ecology of Privet (*Ligustrum lucidum*). MSc thesis, University of Auckland, Auckland.
8. **Contributors and Date of last revision:**

Mel Norris (formerly van Aalst), University of Auckland, March 1991

CHEMICAL CONTROL SHEET

Weed species common name: European larch

User & Location	Chemical	Application Rate	Method of Application	Season of Application	Periodicity	Success Rating
Auckland City Council (1986) Orakei Basin	Escort	Not known	Sprayed onto regrowth and nursery crop of natives planted		One application	Failure-regrowth too aggressive, natives could not establish
“	Not known	Not known	Privet slashed stumps painted/regrowth sprayed; woolly nightshade left as nursery crop for natives		One application	90% success, woolly nightshade good cover crops for natives
“	Garlon	Not known	Painted onto trunks of mature trees - under planted with natives		One application	70% success, some specimens sustained limited life and seeded prolifically. Some natives also affected by Garlon.
“	Not known	Not known	Native plants planted amongst mature privet			40% success
Cromwell 1990 Ruakura, Warkworth	Escort	35 g/100 L	Foliar spray/painted on cut stumps		Spring or autumn	Cromwell 1990
North Shore City	Roundup	20% solution	Paint on to cut stumps within 10-15 mons of cutting		One application	
Porteous, 1993	Roundup + Pulse	2%	Knapsack, brushgun	Spring or autumn		Apply to actively growing plants
Porteous, 1993	Escort	5 g/10 L + 10 ml Pulse	Cut stump, frilling, injection			

Ligustrum sinense
Chinese privet

TAXON SHEET

1. **Common name:** Chinese privet
Family: Oleaceae
Formal name: *Ligustrum sinense* Lour.
Synonym:
2. **Growth form:** small tree
3. **Distribution:**
[abundance rating = low (l), medium (m), high (h) for present/potential infestation]

Auckland (h/h)
Northland (?/h?)
Waikato (?/h?)
Bay of Plenty (?/h?)
Coromandel (?/h?)

4. **Habitat:** coastal, lowland
5. **Communities:** scrub and forest margin, roadsides, fencelines, open forest
6. **Fertility:** low, low-moderate, moderate, high
7. **Response to environment:**

Response to

drought	tolerant
shade	highly tolerant
frost	not known -possibly intolerant
poor drainage	slightly tolerant -tolerates clay soil

physical damage	resprouts
grazing	resprouts
fire (plants, seeds)	unknown
other	can cope with passion vinehopper infestations

Seedling requirements and tolerances

seedlings shade tolerant, optimum germination temperature 20-25°C;
seeds germinate in the dark

Growth rates

seedlings	unknown
adults	unknown

8. Growth and reproduction:

Breeding system

flowering type bisexual
method of pollination insect
other comments flowers strongly perfumed, this may be an irritant to many people producing hay fever symptoms

Life cycle

type perennial
flowering time September -December
fruiting time November/December - February/March
other comments

Deciduous/evergreen evergreen

Age of reproduction

sexual 3-4 years
asexual unknown

Life span (years) unknown

Seed

production yes
dispersal gravity, vertebrates
viability 3-4 month old berries freshly picked c.50-60% germination
germination berry does not need to be removed for seed germination
seed bank 30-40% seeds 6 months storage under 4°C re Fridgeration - unknown if they would survive longer

Vegetative reproduction

resprouts from base

Comments

9. Browsers and parasites:

passion vine hopper (*Scolypopa australis* -Hemiptera)

10. General facilitation: originally spread from domestic hedges; bird dispersed seed

11. Contributors and Date of last revision:

Mel Norris (formerly van Aalst), University of Auckland, March 1991

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** Chinese privet
Formal name: *Ligustrum sinense* Lour.
2. **Illustration:** Goulding, J.H. 1973: Privets. *Annual Journal of the Royal NZ Institute of Horticulture* 1: 45-48.
3. **Impact on biota and ecosystem**
 - Plant -plant relationships
Forest margins, scrub, gardens; competes with other shrub-sized plants; grows outwards rather than upwards
 - Plant -animal relationships
berries are food source for birds e.g. blackbird (*Turdus merula*), waxeye (*Zosterops lateralis*); heavily predated by passion vine hopper (*Scolypopa australis*)
 - Ecosystem
 - Other pollen allergenic/scent irritant to some people
4. **Management:**
 - Hand control pull or dig out seedlings
 - Mechanical
 - Chemical control see Chemical Control Sheet
 - Combination chainsaw base and treat stump with herbicide (neat) or 1:20 herbicide/diesel mix, pour herbicide or mix into holes drilled in top of stump control
 - Biological control
 - Other follow up work best done in late spring when in flower
5. **Legislation:** deferred
6. **References:** Cornwall, M.J. 1990: Control of certain environmentally sensitive weeds in forests, reserves and roadsides. *NZ Institute of Noxious Plants Officers Inc. Conference Proceedings 1990*. Pp. 87-90. see tree privet (*Ligustrum lucidum*) on p.165 for further references
7. **Other sources of information and current projects:**
van Aalst, M.M. 1992. Aspects of the Regeneration Ecology of Privet (*Ligustrum lucidum*). MSc thesis, University of Auckland, Auckland.
8. **Contributors and Date of last revision:**
Mel Norris (formerly van Aalst), University of Auckland, March 1991

CHEMICAL CONTROL SHEET

Weed species common name: European larch

User & Location	Chemical	Application Rate	Method of Application	Season of Application	Periodicity	Success Rating
Cornwell 1990 (duPont) Ruakura, Warkworth	Escort	35 g/100 L	foliar spray or painted on to cut stumps	Spring/autumn		Cornwell 1990
Northland Weed Control Manual	Escort	35 g/100 L + 0.1% Pulse	handgun			
Northland Weed Control Manual	Escort	5 g/10 L + 0.1% Pulse	knapsack			
Northland Weed Control Manual	Escort	10 g/10 L + 0.1% Pulse	mistblower			
Northland Weed Control Manual	Roundup	1% + 0.2% Pulse	handgun, knapsack			

8. Growth and reproduction:

Breeding system

flowering type
method of pollination
other comments

Life cycle

type
flowering time September - May
fruiting time
other comments

Deciduous/evergreen evergreen, semi-evergreen in cold districts

Age of reproduction

sexual
asexual

Life span (years)

Seed

production
dispersal bird
viability
germination
seed bank

Vegetative reproduction

Comments

9. Browsers and parasites:

10. General facilitation:

dispersed by birds and road machinery, roads are typical dispersal routes

11. Contributors and Date of last revision:

SMT, January 1994, compiled from: Flora of New Zealand volume IV

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** Japanese honeysuckle
Formal name: *Lonicera japonica*
2. **Illustration:** Upritchard, E.A. comp. 1985: A guide to the identification of New Zealand common weeds in colour. NZ Weed and Pest Control Society, Hastings.
Porteous, T. 1993: Native forest restoration. QEII National Trust.
3. **Impact on biota and ecosystem**
Plant -plant relationships
may form a complete blanket over small trees and shrubs on which it grows

Plant -animal relationships

Ecosystem
4. **Management:**
Hand control pull out small plants, grub out roots of larger plants; can be counter productive because nodes broken off will resprout; plants may resprout if mulched

Mechanical cut stems

Chemical control Escort 35 g + 100 mls Pulse/100 L water by handgun or 5 g + 10 mls Pulse/10 L water knapsack; Tordon Brushkiller 0.6% handgun or knapsack; Roundup found to be effective

Combination cut vines at convenient height in winter, spray regrowth in the spring with 1% Roundup plus 0.1 % Pulse or Escort 2 gms per 10 L water plus 10 mls Pulse

Biological control grazing can be effective
5. **Legislation:** none
6. **References:** Carter, G.A., Teramura, A.H., Forseth, I.N. 1989: Photosynthesis in an open field for exotic versus native vines of the south eastern United States. *Canadian Journal of Botany* 67: 443-446.
Gunnings, B.A. 1964: Controlling honeysuckle in hedges. *NZ Journal of Agriculture* 108: 330.
Leatherman, A.D. 1955: Ecological life history of *Lonicera japonica* Thunb. PhD thesis, University of Tennessee.
Thomas, L.K. Jr 1980: The impact of three exotic plant species on a Potomac Island. *National Park Service Scientific Monograph Series 13*. US Department of the Interior, Washington, DC.
7. **Other sources of information and current projects:**
8. **Contributors and Date of last revision:**
SMT, January 1994, compiled from: Northland Conservancy DOC Weed Control Manual [no date]; North Shore City Noxious Plants Information Sheet, July 1988; Flora of New Zealand volume IV

Lupinus polyphyllus
Russell lupin

TAXON SHEET

1. **Common name:** Russell lupin
Family: Fabaceae
Formal name: *Lupinus polyphyllus*
Synonym:

2. **Growth form:** herb

3. **Distribution:** mid altitude South Island on roadsides, riverbeds, tourist accommodation areas

4. **Habitat:** lowland, montane

5. **Communities:** riverbed, wetland, short tussockland (only roadsides)

6. **Fertility:** low

7. **Response to environment:**

<u>Response to</u>	
drought	intolerant
shade	slightly tolerant
frost	highly tolerant
poor drainage	highly tolerant
physical damage	resprouts from base
grazing	resprouts from base
fire (plants, seeds)	lupin stands unlikely to hold fire because they are fire resistant through steaming; dense stands possibly fire prone when autumn die-off occurs in February -April
other	

<u>Seedling requirements and tolerances</u>	suits low temperature, moist conditions in loose textured soils; intolerant of competition in seedling stage
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<u>Growth rates</u>	
seedlings	faster than other pasture species at low fertility
adults	

8. Growth and reproduction:

Breeding system

flowering type
method of pollination insect
other comments

Life cycle

type non vegetatively spreading perennial November -February
flowering time November-February
fruiting time November-March
other comments

Deciduous/evergreen evergreen (but winter die off of most leaves)

Age of reproduction

sexual 1 year
asexual n/a

Life span (years) 50 year old plants known

Seed

production yes, 200-1000 kg/ha
dispersal explosive, humans, tourists, waterways (particularly in floods)
viability probably 10 or more years
germination autumn and spring
seed bank probably high

Vegetative reproduction

nil

Comments

9. Browsers and parasites:

lowland stands being affected by fungal attacks in recent years

10. General facilitation:

machinery, tourism; being advocated as pasture species for South Island highcountry; common horticultural plant (aesthetically desirable); spread via water courses into river systems where undesirable effects include increased flood potential, loss of habitat for native flora and fauna

11. Contributors and Date of last revision:

D. Scott, Horticultural Research, Christchurch, January 1991
Alicia Warren and R. Maloney, DOC Twizel, March 1992

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** Russell lupin
Formal name: *Lupinus polyphyllus*
2. **Illustration:** Wilson, Hugh 1982: Stewart Island plants. Field guide publications, Christchurch. p.234.
3. **Impact on biota and ecosystem**
 - Plant -plant relationships
legume coloniser of moist, loose textured soils; shades out native mat plants in riverbeds
 - Plant -animal relationships
being advocated as pasture legume for the highcountry; invades riverbeds, destroys habitat for riverbed birds: harbours rabbits and predators of endemic fauna
 - Ecosystem
a range of views on it's aesthetic value, its detrimental effect on native vegetation and riverbed fauna, and its value as an agricultural pasture species; does contribute to flood problems in rivers by building up silt
4. **Management:**
 - Hand control
hand digging effective against small stands but seed load remains in the ground
 - Mechanical
basically ineffective because of regrowth from base
 - Chemical control
Grazon at 3 L or greater gives more than 90% control if applied during growth periods; Roundup less effective; Tordon Brushkiller also effective but not suitable for use in waterways; a general purpose legume herbicide would probably be effective
 - Biological control
lowland stands being infected by fungi causing death in a proportion of old plants; no known systematic investigation but Project River Recovery intends doing a feasibility study; this would be in conflict with its advocacy in agriculture but be beneficial for protecting endemic flora and fauna
5. **Legislation:** none
6. **References:** Scott, D. 1989: Perennial or Russell lupin: A potential highcountry pasture legume. *Proceedings of the NZ Grasslands Association* 50: 203-206.
7. **Other sources of information and current projects:**
David Scott, Horticultural Research, Christchurch
R. Maloney, A. Warren, DOC Twizel (Project River Recovery)
8. **Contributors and Date of last revision:**
David Scott, Horticultural Research, Christchurch, January 1991
R. Maloney, A. Warren, DOC Twizel, March 1992

Lycium ferocissimum
boxthorn

TAXON SHEET

1. **Common name:** boxthorn
Family: Solanaceae
Formal name: *Lycium ferocissimum*
Synonym: *Lycium horridum*
2. **Growth form:** shrub
3. **Distribution:** widespread in coastal areas from North Auckland to Foveaux Strait
4. **Habitat:** lowland, coastal
5. **Communities:** sand dunes, shrubland
6. **Fertility:** low
7. **Response to environment:**

Response to

drought tolerant

shade intolerant

frost

poor drainage

physical damage

grazing

fire (plants, seeds)

other

Seedling requirements and tolerances

Growth rates

seedlings

adults

8. Growth and reproduction:

Breeding system

flowering type

method of pollination

other comments

Life cycle

type

flowering time July-March

fruiting time

other comments

Deciduous/evergreen evergreen

Age of reproduction

sexual

asexual

Life span (years)

Seed

production

dispersal bird

viability

germination

seed bank

Vegetative reproduction

Comments

9. Browsers and parasites:

10. General facilitation: bird dispersed

11. Contributors and Date of last revision:

SMT, December 1993, compiled from: Northland Conservancy DOC
Weed Control Manual [no date]

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** boxthorn
Formal name: *Lycium ferocissimum*
2. **Illustration:** Upritchard, E.A. 1985: A guide to the identification of New Zealand common weeds in colour. New Zealand Weed & Pest Control Society, Hastings.
Porteous, T. 1993: Native forest restoration. QEII National Trust, Wellington.
3. **Impact on biota and ecosystem**
 - Plant -plant relationships
often the only woody plant present on coastal sand dunes
 - Plant -animal relationships
birds can get caught up in spiny bush
 - Ecosystem
 - Other
4. **Management:**
 - Hand control
 - Mechanical
 - Chemical control 1-1.25% Roundup, handgun or knapsack, using Pulse may give poor results
 - Combination chainsaw and paint stump with Yates stump stick, Roundup 20% or Tordon Brushkiller 20%; frill and apply 20% Roundup or undiluted Tordon; same rates for injection
 - Biological control
 - Other
5. **Legislation:** class B noxious plant, target or widespread depending on area
6. **References:** Parsons, W.T. 1973: Noxious weeds of Victoria. Inaka Press, Melbourne.
7. **Other sources of information and current projects:**
some control trials conducted on Mana Island, Wellington Conservancy DOC
8. **Contributors and Date of last revision:**
SMT, January 1994, compiled from: Northland Conservancy DOC Weed Control Manual [no date]; Porteous, T. 1993 (see above)

Myriophyllum aquaticum
parrot's feather

TAXON SHEET

1. **Common name:** parrot's feather
Family: Haloragaceae
Formal name: *Myriophyllum aquaticum*
Synonym: *M. brasiliense*

 2. **Growth form:** herb

 3. **Distribution:**
[abundance rating = low (l), medium (m), high (h) for present/potential infestation]

Auckland (l/m)
Waikato (l/m)
Wairarapa (l/l)
South Manawatu (l/l)
Kaiapoi (only observation in South Island)

 4. **Habitat:** coastal, lowland

 5. **Communities:** riverbed, water

 6. **Fertility:**

 7. **Response to environment:**

Response to
drought
shade
frost
poor drainage

physical damage stems readily become detached and form new growth vegetatively
grazing
fire (plants, seeds)
other
- Seedling requirements and tolerances
- Growth rates
seedlings extremely fast growing in summer
adults extremely fast growing in summer

8. Growth and reproduction:

Breeding system

flowering type dioecious
method of pollination
other comments male flowers not seen in New Zealand

Life cycle

type
flowering time erratic, September to February
fruiting time not seen
other comments

Deciduous/evergreen evergreen

Age of reproduction

sexual
asexual

Life span (years)

Seed

production
dispersal
viability
germination
seed bank

Vegetative reproduction

new populations easily formed by vegetative reproduction from broken stem fragments

Comments

9. Browsers and parasites:

10. General facilitation:

stems readily become detached from plants in banks in shallow water, these drift to form large floating mats in deeper water; fragments may be spread by flooding, ditch digging machinery, gumboots or dumped as part of goldfish bowl contents

11. Contributors and Date of last revision:

SMT, December 1993, compiled from: North Shore City Noxious Plants Information Sheet, March 1991; Flora of New Zealand volume IV

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** parrot's feather
Formal name: *Myriophyllum aquaticum*
2. **Illustration:**
3. **Impact on biota and ecosystem**
 - Plant -plant relationships
 - Plant -animal relationships
 - Ecosystem extremely fast growing, root system traps silt and organic matter resulting in raised water tables
 - Other
4. **Management:**
 - Hand control
 - Mechanical
 - Chemical control glyphosate 2% (Roundup, Nufarm) + 0.2% Pulse sprayed 4 times over a 10+ week programme (Smart 1991)
 - Combination
 - Biological control
 - Other
5. **Legislation:** none
6. **References:** Smart, R. 1991: North Shore City Noxious Plants Information Sheet.
7. **Other sources of information and current projects:**
8. **Contributors and Date of last revision:**
SMT, December 1993, compiled from: North Shore City Noxious Plants Information Sheet, March 1991

Nassella trichotoma
nassella tussock

TAXON SHEET

1. **Common name:** nassella tussock
Family: Poaceae
Formal name: *Nassella trichotoma*
Synonym: *Stipa trichotoma*
2. **Growth form:** tussock grass
3. **Distribution:** Marlborough, Otago, Canterbury
4. **Habitat:** lowland, montane
5. **Communities:** tussockland, cliff, bluff, riverbed
6. **Fertility:**
7. **Response to environment:**

Response to

drought

shade

frost

poor drainage

physical damage

grazing

fire (plants, seeds)

other

Seedling requirements and tolerances

Growth rates

seedlings

adults

8. Growth and reproduction:

Breeding system

flowering type

method of pollination wind

other comments

Life cycle

type

flowering time

fruiting time

other comments

Deciduous/evergreen

Age of reproduction

sexual

asexual

Life span (years)

Seed

production 10,000 seeds per plant annually

dispersal wind

viability

germination very high

seed bank seeds can last indefinitely in the soil

Vegetative reproduction

yes

Comments

9. Browsers and parasites:

10. General facilitation: windborn seed is the main method of dispersal although rivers, stock and vehicles may inadvertently spread the seed

11. Contributors and Date of last revision:

SMT, December 1993, compiled from: tussock fact sheet, Rabbit Manager's fact pack, MAF, September 1992

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** nassella tussock
Formal name: *Nassella trichotoma*
2. **Illustration:** Upritchard, E.A. comp. 1985: A guide to the identification of New Zealand common weeds in colour. NZ Weed and Pest Control Society, Hastings.
3. **Impact on biota and ecosystem**
 - Plant -plant relationships
 - Plant -animal relationships
 - Ecosystem
 - Other
4. **Management:**
 - Hand control grubbing annually prior to plant setting seed
 - Mechanical
 - Chemical control not a favoured option because it creates bare ground leaving a potential erosion problem
 - Combination
 - Biological control
 - Other
5. **Legislation:** class B target noxious plant
6. **References:** Taylor, N.J. 1987: Ecological aspects of nassella tussock (*Stipa trichotoma*). Botany Division, DSIR, Unpublished Report 608.
Taylor, N.J. 1987: Biological flora and bibliography of *Stipa trichotoma* Nees (Poaceae, nassella tussock). Botany Division, DSIR, Unpublished Report 609.
7. **Other sources of information and current projects:**
8. **Contributors and Date of last revision:** SMT, December 1993, compiled from: tussock fact sheet, Rabbit Manager's fact pack, MAF, September 1992

8. Growth and reproduction:

Breeding system

flowering type
method of pollination
other comments

Life cycle

type
flowering time January-February
fruiting time
other comments

Deciduous/evergreen

Age of reproduction

sexual
asexual

Life span (years)

Seed

production
dispersal
viability
germination
seed bank

Vegetative reproduction

Comments

9. Browsers and parasites:

10. General facilitation:

11. Contributors and Date of last revision:

SMT, December 1993, compiled from: Flora of New Zealand volume IV

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** banana passionfruit
Formal name: *Passiflora mollissima*
2. **Illustration:** Porteous, T. 1993: Native forest restoration. QEII National Trust, Wellington.
3. **Impact on biota and ecosystem**
 - Plant -plant relationships
a vigorous climber capable of smothering forest margins
 - Plant -animal relationships
 - Ecosystem
 - Other
4. **Management:**
 - Hand control hand pull removing all roots
 - Mechanical
 - Chemical control
 - Combination cut vines in winter/spring and spray the regrowth in spring with 2% Roundup
 - Biological control
 - Other
5. **Legislation:** none
6. **References:**
7. **Other sources of information and current projects:**
8. **Contributors and Date of last revision:**
SMT, December 1993, compiled from: Porteous, T. 1993: Native forest restoration (see above)

Pennisetum clandestinum
kikuyu grass

TAXON SHEET

1. **Common name:** kikuyu grass
Family: Poaceae
Formal name: *Pennisetum clandestinum*
Synonym:
2. **Growth form:** grass
3. **Distribution:** common in pastures, waste places and sand dunes in northern of North Island, also present Taranaki and Manawatu coast
4. **Habitat:** coastal
5. **Communities:** sand dune
6. **Fertility:** high
7. **Response to environment:**

Response to

drought very tolerant

shade

frost slightly tolerant

poor drainage tolerant

physical damage resprout from underground rhizomes

grazing resprout from underground rhizomes

fire (plants, seeds)

other

Seedling requirements and tolerances

Growth rates

seedlings

adults

8. Growth and reproduction:

Breeding system

flowering type

method of pollination

other comments

Life cycle

type

flowering time

fruiting time

other comments flowers rarely seen in the past, more common now

Deciduous/evergreen evergreen

Age of reproduction

sexual

asexual

Life span (years)

Seed

production yes

dispersal wind

viability

germination

seed bank

Vegetative reproduction

most common form of spread by pieces of rhizome breaking off and sprouting

Comments

9. Browsers and parasites:

10. General facilitation: dispersal of pieces of rhizome which resprout is aided by grazing animals; a favoured pasture plant in Northland

11. Contributors and Date of last revision:

SMT, December 1993, compiled from: Lambrechtsen, N.C. 1972: What grass is that? Government Printer, Wellington; Northland Conservancy Weed Control Manual [no date]

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** kikyu grass
Formal name: *Pennisetum clandestinum*
2. **Illustration:** Lambrechtsen, N.C. 1972: What grass is that? Government Printer, Wellington.
Porteous, T. 1993: Native forest restoration. QEII National Trust, Wellington.
3. **Impact on biota and ecosystem**
Plant -plant relationships
can smother seedlings and other low growing plants

Plant -animal relationships

Ecosystem

Other
4. **Management:**
Hand control stoloniferous so difficult to dig out, care must be taken not to leave broken rhizome in or on the ground

Mechanical

Chemical control Roundup (without Pulse) 1%, Dowpon 740-SP (16-20 g/L water), Gallant (0.5%); spray new growth in spring or autumn, spot spray regrowth

Combination grazing can be effective

Biological control

Other
5. **Legislation:** none
6. **References:**
7. **Other sources of information and current projects:**
8. **Contributors and Date of last revision:**
SMT, December 1993, compiled from: Lambrechtsen, N.C. 1972: What grass is that? Government Printer, Wellington; Northland Conservancy Weed Control Manual [no date]

Pinus contorta lodgepole pine

TAXON SHEET

1. **Common name:** lodgepole pine
Family: Pinaceae
Formal name: *Pinus contorta*
Synonym:

2. **Growth form:** large tree

3. **Distribution:**
 [abundance rating = low (l), medium (m), high (h) for present/potential infestation]

Mount Tarawera (m/m)
 Karioi/Waiouru (h/h)
 Kaweka Range (m/h)
 MacKenzie Basin (l/m)
 Red Hills/Beebies (l/m)
 Mid Dome (l/m)
 Blue Mountains (m/h)
 Branch/Leatham (h/h)
 Amiri area (l/m)

4. **Habitat:** montane, subalpine

5. **Communities:** tall tussockland, short tussockland

6. **Fertility:** low

7. **Response to environment:**

Response to

drought	tolerant
shade	intolerant (won't establish in a dense forest), tolerant to partial shade
frost	tolerant when established, intolerant when germinating (frost heave)
poor drainage	slightly tolerant
physical damage	regrowth if some green foliage remains
grazing	regrowth unless all live/green foliage has been removed in grazing; reasonably palatable to sheep
fire (plants, seeds)	inland subspecies 'latifolia' has serotinous cones (opened by fire); trees larger than 2 m can withstand a fire; a good hot fire will kill most of the seed on the forest floor, but fire creates a good seedbed for fresh seed

Seedling requirements and tolerances

grows in harsh conditions and where land is not intensively managed

Growth rates

seedlings	young plants and new shoots grow up to 1 m per year
adults	stands on average, or better quality sites grow 270-680 m ³ /ha at age 35 years

8. Growth and reproduction:

Breeding system

flowering type monoecious
method of pollination wind
other comments

Life cycle

type perennial
flowering time pollen production November in the North Island, later in the South Island (inland sites first)
fruiting time January -March
other comments cones usually produced annually, sometimes heavy crop

Deciduous/evergreen evergreen

Age of reproduction

sexual cones mature in 15 months major seed production after 8-10 years; 0.6-1.6 kg seed/hectolitre of cones, 2-300,000 seeds/kg
asexual

Life span (years) less than 80 years

Seed

production yes, a 12 year old, 5 tree is capable of producing just under 15,000 viable seeds/year
dispersal wind
viability 79-90%, rarely drops below 70%
germination spring, germination low; 15°C
seed bank delayed germination still occurring after 4 years; will survive 10-20 years in dry storage at 4°C and maintain 79-90% germination

Vegetative reproduction

Comments regeneration abundant every few years (not every year) and depends on seed production, dispersal, germination, and establishment conditions

9. Browsers and parasites:

sheep, hares, and rabbits

10. General facilitation: seeds carried by wind; seeds very small, light and easily dispersed especially south-east of seed sources; long distant dispersal usually from ridges or exposed hill-top/sides (take off site)

11. Contributors and Date of last revision:

Lisa Langer (previously Crozier), NZ FRI, Christchurch, December 1993
Nick Ledgard, NZ FRI, Rangiora, January 1991

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** lodgepole pine
Formal name: *Pinus contorta*
2. **Illustration:** Dallimore, W., Jackson, A.B. 1976: A handbook of coniferae. Arnold, London.
J.T. Miller, C.E. Ecroyd. 1987: (see references).
3. **Impact on biota and ecosystem**
very large

Plant -plant relationships

in tussock grasslands and high-country pasture which is not managed intensively (i.e. less than 1 stock unit/ha) or not oversown and top dressed, lodgepole pine competes vigorously with surrounding vegetation in the establishment and early growth phase, but can provide a nurse crop for the establishment of native woody vegetation, e.g. beech

Plant -animal relationships

reasonably palatable to sheep

4. **Management:**

Hand control

recommended for seedlings smaller than 0.5 m

Mechanical

felling with hand scrubcutters and chainsaws is only effective if all live foliage is removed

Chemical control

spray with Roundup or apply Tordon 2G granules in the summer (see Chemical Control Sheet)

Combination

apply Ammate XL, Roundup or Sodasem to cut stumps with no more than one whorl of green foliage

Biological control

Other

fire to control dense immature pole stands when canopy closure is virtually completed; grazing remains cheapest and most common management control method

5. **Legislation:** declared class B target noxious plant in Taumarunui, Rangitikei, Waimarino

6. **References:**

Crozier, E.R. 1990: Chemical control of wilding conifer seedlings. Pp. 182-186 in Popay, A.J. (Ed.) Proceedings of 43rd New Zealand Weed and Pest Control Conference.

Crozier, E.R., Ledgard, N.J. 1990: Palatability of wilding conifers and control by simulated sheep browsing. Pp. 139-143 in Bassett, C., Whitehouse, L.J., Zabkiewicz, J.A. (Eds) Alternatives to the Chemical Control of Weeds. *Proceedings of an international conference, Rotorua, New Zealand, July 1989.* Ministry of Forestry. *FRI Bulletin No. 155.*

Crozier, E.R., Zych, J.R., Ledgard, N.J. Control of wilding conifers by applying herbicides to cut stumps. Pp. 160-163 in Popay, A.J. (Ed.) *Proceedings of the 41st New Zealand Weed and Pest Control Conference.*

Langer, E.R. 1992: Chemical control of wilding conifer seedlings in New Zealand.
Plant Protection Quarterly 7(3):135-139.

Langford, M.D. 1984: Natural regeneration of exotic conifers at Lake Coleridge sheep run. School of Forestry dissertation, University of Canterbury. 54 p.

Ledgard, N.J. 1988: The spread of introduced trees in New Zealand's rangelands-South Is. High Country experience. *Tussock Grasslands and Mountain Lands Institute Review 44*: 1-8.

Ledgard, N.J., Crozier, E.R. 1991: Guidelines for the control and management of wilding trees in the Canterbury High Country. Forest Research Contract Report: FWE 91/4.

Miller, J.T., Ecroyd, C.E. 1987: Introduction to forest trees in New Zealand: Recognition, role, and seed source. Forest Research Institute Bulletin No. 124.

Watt, V. 1986: Pine invasion on Maungakakamea (Rainbow Mountain). MSc thesis, University of Waikato, Hamilton.

Wills, B.J., Begg, J.S.C. 1986: The Cockayne plots of Central Otago -a 1985 evaluation. *NZ Journal of Ecology 9*: 41-55.

7. Other sources of information and current projects:

8. Contributors and Date of last revision:

Lisa Langer (previously Crozier), NZ FRI, Christchurch, December 1993
Nick Ledgard, NZ FRI, Rangiora, January 1991

CHEMICAL CONTROL SHEET

Weed species common name: lodgepole pine

User & Location	Chemical	Application Rate	Method of Application	Season of Application	Periodicity	Success Rating
Lisa Langer NZ FRI Christchurch	Roundup	3.6 g glyphosate + 5 ml Silwet L-77	Knapsack	December		100% kill
	“	“	“	July		40% kill- not recommended
	Tordon	1 g picloram granules/tree	Hand application	December		100% kill
	Escort	0.15g mitsulfuron +5ml Silwet L-77	Knapsack	December		35% kill - not recommended
	“	“	“	July		5% kill - not recommended
	Grazon	1.8 g triclopyr (Grazon)	“	December July		15% kill - not recommended 0% kill - not recommended
	2,4-D	7.2 g 2,4-D, +200 ml diesel +3 ml Triton X45	“	December July		5% kill - not recommended 5% kill - not recommended

[continued next page]

CHEMICAL CONTROL SHEET

Weed species common name: lodgepole pine

User & Location	Chemical	Application Rate	Method of Application	Season of Application	Periodicity	Success Rating
Tim Zych, Lisa Langer, Nick Ledgard, Craigieburn	Ammate XL	400 g ammonium sulphamate	Knapsack	December		80-84% 700m a.s.l. and 1,400m a.s.l.
	Glyphosate	72g glyphosate + 10ml Silwet L-77	“	“		75% 1,400m a.s.l. 95% 700m a.s.l.
	Sodakem	3.5g sodium chlorate/tree	Hand application to cut stump surface	“		85% 1,400m a.s.l. 90% 700m a.s.l.
	2,4-D ester	180g 2,4-D + 500ml diesel	Knapsack	“		75% 1,400m a.s.l. 85% 700m a.s.l.

Pinus nigra Corsican pine

TAXON SHEET

1. **Common name:** Corsican pine
Family: Pinaceae
Formal name: *Pinus nigra* Arn.
Synonym:

2. **Growth form:** large tree

3. **Distribution:**
[abundance rating = low (l), medium (m), high (h) for present/potential infestation]

Mount Tarawera (m/h)
Clarence (m/m)
Amuri Range (h/h)
Lake Coleridge (h/l)
MacKenzie Basin (l/m)
Queenstown (l/m)

4. **Habitat:** montane

5. **Communities:** shrubland, tall tussockland, short tussockland

6. **Fertility:** low

7. **Response to environment:**

Response to

drought	tolerant
shade	intolerant -slow starting, light demander
frost	slightly tolerant
poor drainage	intolerant

physical damage	regrowth likely if any green foliage remains intact
grazing	most unpalatable conifer in high-country; regrowth will occur unless all green foliage is removed in grazing
fire (plants, seeds)	trees smaller than 2 m can survive burning; a good hot fire will kill most of the seed on the forest floor, but fire creates a good seedbed for fresh seed

Seedling requirements and tolerances

can grow in harsh conditions, where land is not intensively managed

Growth rates

seedlings	stand volume increment in Canterbury high-country 5-23 m ³ /ha per year
adults	after 20 years on a good site a typical tree would be 15 m in height and 30 cm dbh

8. Growth and reproduction:

Breeding system

flowering type monoecious
method of pollination wind
other comments

Life cycle

type perennial
flowering time pollen production November -December
fruiting time cones ripen in late summer in the second year
other comments seed is shed from early spring in the third year: usually some seed is produced each year but the main seed production occur at 2-5 year intervals

Deciduous/evergreen evergreen

Age of reproduction

sexual major seed production after 10 years in dry Canterbury high country and after about 18 years in Lake Wakatipu region
asexual

Life span (years) less than 80 years

Seed

production yes, 0.345-1.5 kg seed/hectolitre of cones; 30,000-87,000 seeds/kg (average 57,000)
dispersal wind
viability 80-90% expected germination
germination spring
seed bank delayed germination still occurs after 4 years in the high country; seed still remains viable after 10 years if stored in a dry place at 4°C.

Vegetative reproduction

Comments although seed is produced annually, in variable amounts, regeneration is irregular and depends on seed distribution, germination, and establishment conditions

9. Browsers and parasites:

sheep

10. General facilitation:

wind blown seed; long distance dispersal occurs mostly from take-off sites, exposed slopes and ridges

11. Contributors and Date of last revision:

Lisa Langer (previously Crozier), NZFRI, Christchurch. December 1993
Nick Ledgard, NZFRI, Rangiora, January 1991

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** pine, Corsican
Formal name: *Pinus nigra* Arn.
2. **Illustration:**
3. **Impact on biota and ecosystem**
 - Plant -plant relationships
fast growing tree in high country where the native species are low growing herbs, grasses and shrubs
 - Plant -animal relationships
not very palatable to sheep
 - Ecosystem
changes tussock grassland landscape to one with trees
 - Other
produces significant viable seed in drier regions (<800 mm rainfall) of Canterbury high country from about 13 years age
4. **Management:**
 - Hand control
handpull seedlings <0.5 m tall; easier when soil is moist
 - Mechanical
felling with handtools and chainsaws only effective if all live foliage is removed
 - Chemical control
see Chemical Control Sheet
 - Combination
not tested
 - Biological control
 - Other
5. **Legislation:** class B target noxious plant in Amuri Region
6. **References:** see references for lodgepole pine (*Pinus contorta*) on pp. 201-202
7. **Other sources of information and current projects:**
8. **Contributors and Date of last revision:**
Lisa Langer (previously Crozier), NZ FRI, Christchurch, December 1993
Nick Ledgard, NZ FRI, Rangiora, January 1991

CHEMICAL CONTROL SHEET

Weed species common name: Corsican pine

User & Location	Chemical	Application Rate	Method of Application	Season of Application	Periodicity	Success Rating
Lisa Langer NZ FRI Christchurch	Roundup	3.6 g glyphosate + 5 ml Silwet L-77	Knapsack	December		70% kill for seedlings 0.5-2m tall; higher application rate may give a more effective kill
	“	“	“	July		20% kill - not recommended
	Tordon	1 g picloram granules/tree	Hand application	December		60% kill
	Escort	0.15g mitsulfuron +5ml Silwet L-77	Knapsack	December		60% kill
	“	“	“	June		0% kill - not recommended
	Grazon	1.8 g triclopyr (Grazon)	“	December and June		0% kill - not recommended
	2,4-D	7.2 g 2,4-D, +200 ml diesel +3 ml Triton X45	“	December and June		0% kill - not recommended

Pinus pinaster maritime pine

TAXON SHEET

- Common name:** maritime pine
Family: Pinaceae
Formal name: *Pinus pinaster* Aiton
Synonym:
- Growth form:** large tree
- Distribution:**
[abundance rating = low (l), medium (m), high (h) for present/potential infestation]

Northland (?)
Abel Tasman National Park (m/m)
Coromandel Peninsula (?)
Marlborough Sounds (l/l)
Central North Island (?)
Hanmer Springs (l/l)

- Habitat:** coastal, lowland
- Communities:** shrubland, short tussockland, cliff, bluff, coastal
- Fertility:** low
- Response to environment:**

Response to

drought	tolerant
shade	tolerant of partial shade, intolerant of dense shade for establishment
frost	tolerant
poor drainage	intolerant

physical damage	regrowth likely if green foliage remains intact
grazing	regrowth expected unless all green foliage is removed in grazing
fire (plants, seeds)	regenerates readily after fire if seed source adjacent
other	

Seedling requirements and tolerances

grows in harsh conditions and where land is not intensively managed

Growth rates

seedlings	height growth in early years 70 cm per metre per year
adults	mean annual increment 8-17 m ³ /ha per year

8. Growth and reproduction:

Breeding system

flowering type
method of pollination wind
other comments

Life cycle

type perennial
flowering time pollen production September -October
fruiting time December -March, cones mature 27 months after pollination
other comments cones usually produced annually, large crop most years

Deciduous/evergreen evergreen

Age of reproduction

sexual age of first flowering 5-10 years; major seed production after 8 years
asexual

Life span (years) less than 80 years

Seed

production yes, 0.75-1 kg seed/hectolitre of cones; 11,000-15,000 seeds/kg
dispersal wind
viability expected germination 75-90%
germination spring
seed bank delayed germination likely; will survive 10-20 years in storage under 10% moisture content at 5°C

Vegetative reproduction

Comments

9. Browsers and parasites:

sheep, possum (can ring bark leaders and damage laterals), hares (sometimes damage young trees)

10. General facilitation:

wind spread seed, although seed is relatively heavy and large compared with pine, larch and Corsican pine; compared to these species (and radiata pine), maritime pine is a shy spreader

11. Contributors and Date of last revision:

Lisa Langer (previously Crozier), NZ FRI, Christchurch, December 1993
Nick Ledgard, NZ FRI, Rangiora, January 1991

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** maritime pine
Formal name: *Pinus pinaster* Aiton
2. **Illustration:** Dallimore, W., Jackson, A.B. 1976: A handbook of coniferae. Arnold, London.
Knowles, F.B. and Miller, J.T. 1989 (see references).
3. **Impact on biota and ecosystem**
medium

Plant -plant relationships

affects tussock grasslands and high country land which is not intensively grazed or oversown and regularly; in scrub only invades after disturbance such as fire; competes with native vegetation but can also provide a nurse crop for native species

Plant -animal relationships

establishment

Ecosystem

Other

4. **Management:**

Hand control recommended for seedlings smaller than 0.5 m tall

Mechanical fell with handtools, scrubcutters and chainsaws removing all green foliage

Chemical control untested

Combination untested

Biological control

Other grazing remains cheapest and most common management control technique

5. **Legislation:** none
6. **References:** Knowles, F.B. and Miller, J.T. 1989: Introduced forest trees in New Zealand: Recognition, role, and seed source 8. *Pinus pinaster* Aiton. *FRI Bulletin No.124*.
see also references under pine (*Pinus contorta*) on pp.201-202
7. **Other sources of information and current projects:**
8. **Contributors and Date of last revision:**
Lisa Langer (previously Crozier), NZ FRI, Christchurch, December 1993
Nick Ledgard, NZ FRI, Rangiora, January 1991

Pinus radiata radiata pine

TAXON SHEET

1. **Common name:** radiata pine
Family: Pinaceae
Formal name: *Pinus radiata* D. Don
Synonym:
 2. **Growth form:** large tree
 3. **Distribution:**
[abundance rating = low (l), medium (m), high (h) for present/potential infestation]

Mount Tarawera (l/l)
Marlborough Sounds (m/m)
Central Plateau (m/m)
Red Hills (l/l)
Associated with most plantations, usually on a small scale; becomes less able to spread with increasing altitude
 4. **Habitat:** coastal, lowland
 5. **Communities:** scrub and forest margin, shrubland, short tussockland, sand dune, cliff, bluff
 6. **Fertility:** low
 7. **Response to environment:**

Response to
drought tolerant
shade intolerant
frost intolerant
poor drainage

physical damage regrowth likely if green foliage remains intact
grazing relatively palatable conifer, but can regrow if green foliage remains
fire (plants, seeds) responds readily after fire, if a seed source is adjacent
other
- Seedling requirements and tolerances
can establish in hard conditions where land is not intensively grazed or oversown and topdressed but is susceptible to out-of-season frosts and extreme winter cold in early years
- Growth rates
seedlings stand increment 19-29 m³/ha per year in Canterbury high-country
adults height growth of 1 m/year and greater

8. Growth and reproduction:

Breeding system

flowering type monoecious
method of pollination wind blown pollen
other comments

Life cycle

type perennial
flowering time late winter -early spring
fruiting time late summer, 18 months after flowering
other comments

Deciduous/evergreen evergreen

Age of reproduction

sexual 8-10 years
asexual

Life span (years) less than 80 years

Seed

production yes, annual
dispersal wind
viability 80% +
germination spring
seed bank delayed germination still occurring after 4 years in the high country

Vegetative reproduction

Comments

a very versatile species but more temperature dependent (warmth) than lodgepole, Corsican and ponderosa pine, Douglas fir and larch; therefore not a ready spreader in montane environments

9. Browsers and parasites:

sheep, hares, and rabbits

10. General facilitation: wind blown seed, heavier than most other species and therefore distribution more limited; in high country only spreads on warmer slopes, susceptible to late and early frosts in initial years

11. Contributors and Date of last revision:

Lisa Langer (previously Crozier), NZ FRI, Christchurch, December 1993
Nick Ledgard, NZ FRI, Rangiora, January 1991

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** radiata pine
Formal name: *Pinus radiata* D.Don
2. **Illustration:** Dallimore, W., Jackson, A.B. 1976: A handbook of coniferae. Arnold, London.
3. **Impact on biota and ecosystem**
medium

Plant -plant relationships
affects tussock grasslands, where there is no intensive grazing
oversowing and topdressing

Plant -animal relationships
highest mortality, compared with other conifers in the highcountry,
occurred in palatability sheep grazing trial

Ecosystem
4. **Management:**

Hand control recommended for seedlings greater than 0.5 m tall

Mechanical fell with handtools, scrubcutters and chainsaws removing all green foliage; vigorous ringbarking and leave to rot

Chemical control spray seedlings with Roundup or Escort in the summer; see Chemical Sheet for details

Combination untested

Biological control

Other grazing remains cheapest and most common management control technique
5. **Legislation:** none
6. **References:** Crozier, E.R. 1990: Chemical Control of wilding conifer seedlings.
Crozier, E.R. and Ledgard, N.J. 1990: Palatability of wilding conifers and control by simulated sheep browsing. In Ministry of Forestry FRI Bulletin 155.
see references under lodgepole pine, pp 201-202
7. **Other sources of information and current projects:**
8. **Contributors and Date of last revision:**
Lisa Langer (previously Crozier), NZ FRI, Christchurch, December 1993
Nick Ledgard, NZ FRI, Rangiora, January 1991

CHEMICAL CONTROL SHEET

Weed species common name: radiata pine

User & Location	Chemical	Application Rate	Method of Application	Season of Application	Periodicity	Success Rating
Lisa Langer NZ FRI Christchurch	Roundup	3.6 g glyphosate + 5 ml Silwet L-77	Knapsack	December		85% kill
	“	“	“	July		10% kill - not recommended
	Tordon	1 g picloram granules/tree	Hand application	December		45% kill - not recommended
	Escort	0.15g mitsulfuron +5ml Silwet L-77	Knapsack	December		95% kill
	“	“	“	June		5% kill - not recommended
	Grazon	1.8 g triclopyr (Grazon)	“	December and June		5% kill - not recommended
	2,4-D	7.2 g 2,4-D, +200 ml diesel +3 ml Triton X45	“	December and June		5% kill - not recommended 0% kill - not recommended

8. Growth and reproduction:

Breeding system

flowering type monoecious. outbreeding
method of pollination wind
other comments

Life cycle

type perennial
flowering time spring (September - October)
fruiting time late summer (February -March) seed dispersal
other comments

Deciduous/evergreen evergreen

Age of reproduction

sexual 6-12 years, major seed production from year 12 onwards
asexual

Life span (years) 80-100 years+; at least 400 years in native habitat

Seed

production yes, large numbers, 0.5-1 kg of seed per mature tree, i.e. more than 20,000 viable seeds annually
dispersal wind, gravity
viability 80%+
germination spring, shortly after dispersal
seed bank seed can remain viable for a few weeks to many years; delayed germination still occurring after 4 years in highcountry

Vegetative reproduction

Comments

regeneration can occur annually but usually less frequent depending on seed production and dissemination, germination, and initial establishment conditions; parthenocarpy reasonably common; on very frosty sites female conelets are completely killed by ice before they have a chance to develop

9. Browsers and parasites:

sheep, hares, and rabbits

- 10. General facilitation:** wind blown seed in autumn and winter; most spread occurs within a few hundred metres down wind of source; most distant dispersal occurs from take-off sites (ridges and exposed slopes); consolidation from resultant outliers left to seed and regenerate locally; seedlings establish most readily on well lit sheltered sites where there is little competition from other vegetation; they seldom spread onto land where vegetation cover (grass, shrubs or trees) is dense

11. Contributors and Date of last revision:

Lisa Langer (previously Crozier), NZ FRI, Christchurch, December 1993
Nick Ledgard, NZ FRI, Rangiora, January 1991
F.B. Knowles, NZ FRI, Rotorua, February 1991

IMPACTS AND MANAGEMENT SHEET

- 1. Common name:** Douglas fir
Formal name: *Pseudotsuga menziesii*
- 2. Illustration:** Dallimore, W., Jackson, A.B. 1976: A handbook of coniferae. Arnold, London.
- 3. Impact on biota and ecosystem**
medium -large

Plant -plant relationships

regeneration will suppress local vegetation; competes vigorously with native forest species: adult tree with large branches can shade 30 m²+

Plant -animal relationships

in treeless areas is a favoured bird nesting species especially to age 15 years

Ecosystem

4. Management:

Hand control recommended for seedlings smaller than 0.5 m tall

Mechanical fell with handtools, scrubcutters and chainsaws removing all green foliage

Chemical control spray with glyphosate or metsulfuron, or apply picloram granules in the summer; if a winter operation is more suitable, spray with glyphosate; see Chemical Control Sheet

Combination apply Ammate XL, Roundup or Sodakem to cut stumps with only one whorl of live branches

Biological control would endanger commercial plantings

Other grazing remains cheapest and most common management control method

5. Legislation:

none

- 6. References:**
Crozier. E.R. 1990: Chemical control of wilding conifer seedlings. Plant Protection Quarterly 7(3) 135-139.
Crozier. E.R. and Ledgard, N.J. 1990. Palatability of wilding conifers and control of sheep browsing.
Forest Research Institute 1990: The spread of trees in New Zealand high country. Whats New in Forest Research. 4p.
James, R.N. 1975: A review of Douglas fir in New Zealand. *NZ Journal of Forestry* 20:117-128.

7. Other sources of information and current projects:

8. Contributors and Date of last revision:

Lisa Langer (previously Crozier), NZ FRI, Christchurch, December 1993
Nick Ledgard, NZ FRI, Rangiora, January 1991
F.B. Knowles, NZ FRI, Rotorua, February 1991

CHEMICAL CONTROL SHEET

Weed species common name: radiata pine

User & Location	Chemical	Application Rate	Method of Application	Season of Application	Periodicity	Success Rating
Lisa Langer NZ FRI Christchurch	Roundup	3.6 g glyphosate + 5 ml Silwet L-77	Knapsack	December		90% kill
	“	“	“	July		90% kill
	Tordon	1 g picloram granules/tree	Hand application to base of seedling	December		100% kill
	Escort	0.15g mitsulfuron +5ml Silwet L-77	Knapsack	December		80% kill
	“	“	“	July		40% kill - not recommended
	Grazon	1.8 g triclopyr (Grazon)	“	December July		10% kill - not recommended 5% kill - not recommended
	2,4-D	7.2 g 2,4-D, +200 ml diesel +3 ml Triton X45	“	December July		10% kill - not recommended 0% kill - not recommended

Racosperma dealbatum
silver wattle

TAXON SHEET

1. **Common name:** silver wattle
Family: Fabaceae
Formal name: *Racosperma dealbatum*
Synonym: *Acacia dealbata*
Acacia decurrens var. *dealbata*
2. **Growth form:** shrub to large tree
3. **Distribution:**
[abundance rating = low (l), medium (m), high (h) for present/potential infestation]
4. **Habitat:**
5. **Communities:** shrubland
6. **Fertility:** riverbed
7. **Response to environment:**

Response to

drought
shade
frost
poor drainage

physical damage
grazing
fire (plants, seeds) regenerates well after fire
other

Seedling requirements and tolerances

Growth rates

seedlings
adults

8. Growth and reproduction:

Breeding system

flowering type
method of pollination
other comments

Life cycle

type
flowering time July - September
fruiting time
other comments

Deciduous/evergreen

Age of reproduction

sexual
asexual

Life span (years)

Seed

production yes, prolific
dispersal explosive
viability
germination
seed bank

Vegetative reproduction

suckering; in many areas silver wattle forms dense stands by suckering

Comments

9. Browsers and parasites:

10. General facilitation:

cultivation escape, seeds prolifically and suckers

11. Contributors and Date of last revision:

SMT, December 1993, compiled from: Flora of New Zealand volume IV

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** silver wattle
Formal name: *Racosperma dealbatum*
2. **Illustration:** Porteous, T. 1993: Native forest restoration. QEII National Trust, Wellington.
3. **Impact on biota and ecosystem**
Plant -plant relationships
sprouts where canopy gap occurs; displaces native forest species
Plant -animal relationships
Ecosystem a nitrogen fixer which is a threat to gumlands; unchecked growth in cleared areas can result in wattle forest
4. **Management:**
Hand control hand pull seedlings; ring bark large trees -remove bark from 20 cm height down to ground level, paint exposed area with herbicide
Mechanical
Chemical control Grazon 1 part/20 parts water or diesel for swabbing on ringbarked or felled tree stumps; spray 1% Roundup; Tordon Brushkiller at 20% on cut stumps or 1.5 undiluted per cut/hole for frilling/injection
Combination
Biological control
5. **Legislation:** none
6. **References:** New, T.R. 1984: A biology of Acacias. OUP, Melbourne.
Reigosa, M.J., Casal, J.F., Carballera, A. 1984: Alleopathous affect of *Acacia dealbata* Link during flowering. *Stydia Oecologica* : 135-150.
Jeffery, D.J., Holmes, P.M., Rebelo, A.G. 1988: Effects of dry heat on seed germination in selected indigenous and alien legume species in South Africa. *South African Journal of Botany* 54: 28-34.
7. **Other sources of information and current projects:**
8. **Contributors and Date of last revision:**
SMT, December 1993, compiled from: Northland Conservancy Weed Control Manual [no date]: Porteous, T. 1993 (see above)

Rhamnus alaternus evergreen buckthorn

TAXON SHEET

1. **Common name:** evergreen buckthorn
Family: Rhamnaceae
Formal name: *Rhamnus alaternus*
Synonym:
2. **Growth form:** small tree
3. **Distribution:** Auckland and Inner Hauraki Gulf (h) -Auckland waterfront, Rangitoto, Motutapu, Brown's, Motuihe, Waiheke; Wellington, Marlborough, Canterbury and Otago (I)
4. **Habitat:** coastal, lowland
5. **Communities:** scrub, forest margins, tall forest, low forest, shrubland, fernland, cliff and bluff, bare rock, river verges
6. **Fertility:** low, low-moderate
7. **Response to environment:**

Response to

drought	highly tolerant
shade	highly tolerant
frost	highly tolerant
poor drainage	tolerant
physical damage	resprout (adults)
grazing	resprout (adults)
fire (plants, seeds)	resprout (adults), produces large, leafy watershoots from base of tree
other	

Seedling requirements and tolerances

Growth rates

seedlings
adults

8. Growth and reproduction:

Breeding system

flowering type
method of pollination
other comments

Life cycle

type perennial
flowering time April -September
fruiting time August -January
other comments fruit mature, expand and become very juicy as they turn red to black;
this maturation is staggered over the fruiting season, both on individual
trees, and between individual trees

Deciduous/evergreen evergreen

Age of reproduction

sexual
asexual

Life span (years)

Seed

production yes, 3 seeds/fruit; 10,000+ fruit per 8m tall individual
dispersal bird
viability approx 80%
germination
seed bank

Vegetative reproduction

spreads underground

Comments

9. Browsers and parasites:

fruit flesh often chewed by leaf roller caterpillars; a weevil feeds on seed
effectively killing the seed; leaves, seedlings and fruit palatable to possum,
wallabies and cattle

10. General facilitation:

birds such as myna, blackbird, thrush, starling spread seed

11. Contributors and Date of last revision:

Mairie Fromont, PhD student Auckland University, December 1993

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** evergreen buckthorn
Formal name: *Rhamnus alaternus*

2. **Illustration:**

3. **Impact on biota and ecosystem**
very large

Plant -plant relationships

replaces native vegetation; has the potential to form a monoculture, prevents regeneration of native plant seedlings

Plant -animal relationships

Ecosystem

Other

4. **Management:**

Hand control pulling of seedlings reasonably effective

Mechanical no satisfactory method known

Chemical control

Combination

Biological control

Other

5. **Legislation:** none

6. **References:** Zohary, M. 1962: Plant Life of Palestine.
Tutin, T.G., V.H. Heywood *et al.* 1968: Flora Europaea, vol. 2. Rosaceae to Umbelliferae. Cambridge University Press

7. **Other sources of information and current projects:**
Phil Brady, Wellington Conservancy Office, DOC
Colin Ogle, Wanganui Conservancy Office, DOC
Jack Craw, Noxious Plants Officer, Whangarei (general interest in invasive forest weeds)

8. **Contributors and Date of last revision:**
Mairie Fromont, PhD student Auckland University, December 1993

Rosa rubiginosa
sweet briar

TAXON SHEET

1. **Common name:** sweet briar
Family: Rosaceae
Formal name: *Rosa rubiginosa*
Synonym: *Rosa eglantheria*
2. **Growth form:** shrub
3. **Distribution:** in nearly all districts, especially abundant in drier eastern areas from Hawkes Bay south
4. **Habitat:** lowland
5. **Communities:** tussock land, open sites, river flats, banks and terraces, stream sides
6. **Fertility:** high
7. **Response to environment:**

Response to
drought
shade intolerant
frost
poor drainage intolerant

physical damage
grazing
fire (plants, seeds) temporarily reduces the vigour of the bush but encourages regrowth
other

Seedling requirements and tolerances

Growth rates

seedlings
adults

8. Growth and reproduction:

Breeding system

flowering type

method of pollination

other comments partial or complete self-fertilisation

Life cycle

type

flowering time November - January

fruiting time February - May

other comments

Deciduous/evergreen deciduous

Age of reproduction

sexual

asexual

Life span (years)

Seed

production high seed output per plant

dispersal

viability at least 3 years

germination

seed bank

Vegetative reproduction

subterranean stem suckers arise from strong rhizomatous roots and form new colonies of shoots

Comments

9. Browsers and parasites:

small native wasp attacks hips during autumn and winter

10. General facilitation:

birds and domestic stock eat hips and thus disperse seed

11. Contributors and Date of last revision:

SMT, December 1993, compiled from: Sweet briar fact sheet, Rabbit Manager's fact pack, MAF, September 1992; Flora of New Zealand volume IV

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** sweet briar
Formal name: *Rosa rubiginosa*
2. **Illustration:** Upritchard, E.A. comp. 1985: A guide to the identification of New Zealand common weeds in colour. NZ Weeds and Pest Control Society, Hastings.
3. **Impact on biota and ecosystem**
 - Plant -plant relationships
 - Plant -animal relationships
 - birds and domestic stock eat succulent hips
 - Ecosystem
 - grow where other woody plants not present
 - Other
4. **Management:**
 - Hand control
 - Mechanical
 - Chemical control
 - Escort and Tordon Brushkiller are registered for the control of sweet briar
 - Combination
 - Biological control
 - goats can reduce the bulk of plants
 - Other
5. **Legislation:**
 - class B target or widespread noxious plant in some districts
6. **References:**
 - Hunter, G.G. 1983: An assessment of the distribution of sweet briar (*Rosa rubiginosa*) in New Zealand. *NZ Journal of Experimental Agriculture* 11 : 181-1
 - Meeklah, F.A., Mitchell, R.B. 1981: Evaluation of the spot-gun technique for control of sweet briar. *Proceedings of the Sixth Australian Weeds Conference* : 99-103.
 - Molloy, B.P.J. 1964: Synopsis of structure, life history and seasonal behaviour of sweet briar. *Proceedings of the 17th New Zealand Weed and Pest Control Conference* : 19-27.
 - Turner, M.McD., Iggo, G., Meeklah, F.A. 1986: The effect of metsulfuron on sweet briar. *Proceedings of the 39th New Zealand Weed and Pest Control Conference* : 95-98.
7. **Other sources of information and current projects:**
8. **Contributors and Date of last revision:**
 - SMT, December 1993, compiled from: Sweet briar fact sheet, Rabbit Manager's fact pack, MAF, September 1992

Rubus fruticosus
blackberry

TAXON SHEET

1. **Common name:** blackberry
Family: Rosaceae
Formal name: *Rubus fruticosus* agg
Synonym:
2. **Growth form:** scrambling shrub
3. **Distribution:** widespread throughout and generally occurring wherever there has been settlement or significant disturbance of primary vegetation
4. **Habitat:** coastal, lowland
5. **Communities:** scrub and forest margins, shrubland, fernland, riverbeds, wetland
6. **Fertility:**
7. **Response to environment:**

Response to

drought

shade partially tolerant

frost

poor drainage partially tolerant

physical damage resprouts

grazing resprouts

fire (plants, seeds)

other

Seedling requirements and tolerances

marginal light demanding

Growth rates

seedlings rapid

adults rapid

8. Growth and reproduction:

Breeding system

flowering type
method of pollination
other comments

Life cycle

type
flowering time November -April (May)
fruiting time November -May
other comments

Deciduous/evergreen

Age of reproduction

sexual
asexual

Life span (years)

Seed

production
dispersal
viability
germination
seed bank

Vegetative reproduction

suckers to form new plants

Comments

the various taxa in the *Rubus fruticosus* aggregate have different biologies and thus differ in their ecological interactions on different types of sites e.g. their response to herbicides differs

9. Browsers and parasites:

two species of rust fungus, *Kuebneola uredinis* and *Phragmidium violaceum* occur

10. General facilitation:

bird dispersed fruit; suckering

11. Contributors and Date of last revision:

SMT, December 1993, compiled from: Flora of New Zealand volume IV; Bergin and Shaw 1993 (see references)

CHEMICAL CONTROL SHEET

Weed species common name: blackberry

User & Location	Chemical	Application Rate	Method of Application	Season of Application	Periodicity	Success Rating
Rod Smart, North Shore City	Glyphosate	1% + 0.2% Pulse	Knapsack gunspray	December - April	Once	Permanent results
Northland Conservancy	Escort	20-35 g + 100 mls Pulse/100 L water	Handgun	January-June		
		5 g + 10 mls Pulse/10 L water	Knapsack	January-June		
		10 g + 10 mls Pulse/10 L water	mistblower	January-June		
Northland Conservancy	Roundup	1% + 0.2% Pulse	Handgun Knapsack			Only bushes with a well developed canopy of leaves not drought stressed should be treated; some regrowth 1-2 years
Northland Conservancy	Tordon 26	55 g Tordon per m ²	Granules over top of bush extending out 300 cm from drip line	Anytime except late autumn/winter	Spot application	Herbicide has long residual life in soil
Northland Conservancy	Grazon or Tordon Brushkiller	0.5% 0.6%	Handgun Knapsack	Late-spring - early autumn		Remove canes following spring and treat regrowth

Salix fragilis
crack willow

TAXON SHEET

1. **Common name:** crack willow
Family: Salicaceae
Formal name: *Salix fragilis*
Synonym:
2. **Growth form:** tree, shrub
3. **Distribution:** widespread and often abundant throughout New Zealand
4. **Habitat:** lowland
5. **Communities:** waterways, ponds, lakesides and other wet habitats
6. **Fertility:**
7. **Response to environment:**

Response to

drought

shade intolerant

frost

poor drainage highly tolerant

physical damage

brittle, easily broken shoots grow extremely easily

grazing

resprouts

fire (plants, seeds)

other

Seedling requirements and tolerances

Growth rates

seedlings

rapid

adults

rapid

8. Growth and reproduction:

Breeding system

flowering type

method of pollination

other comments hybridises readily with *Salix alba* var *vitellina*

Life cycle

type

flowering time September -October

fruiting time

other comments catkins usually male, rarely female

Deciduous/evergreen deciduous

Age of reproduction

sexual

asexual

Life span (years)

Seed

production yes

dispersal waterways

viability

germination

seed bank

Vegetative reproduction

brittle, easily broken shoots grow extremely easily and are transported by waterways

Comments

9. Browsers and parasites:

10. General facilitation: water movement of broken shoots

11. Contributors and Date of last revision:

Hans Rook, Department of Conservation, Napier, September 1992
SMT, December 1993, compiled from: Flora of New Zealand volume IV
Wilson, Hugh 1982: Stewart Island plants. Field guide publications,
Christchurch, 89.

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** crack willow
Formal name: *Salix fragilis*

2. **Illustration:**

3. **Impact on biota and ecosystem**
very large

Plant -plant relationships

crack willow displaces native wetland species by crowding out and shading

Plant -animal relationships

willows eventually alter vegetation structures often to the detriment of wildlife species

Ecosystem

only 10% of wetlands remain since Europeans colonised New Zealand; a great many of these wetlands have had their natural water regimes tampered with which has favoured crack willow establishment and spread

4. **Management:**

Hand control

Mechanical

Chemical control

plants up to 150 in diameter -cut and swab immediately with Ammate (neat); 100% kill rate if done thoroughly; this method can be used all through the summer period; plants greater than 150 mm in diameter - drill holes every 150 mm around base of willows, inject 80 cc of Ammate (neat) per hole; this method is best used in late February, March and April; 70-80% kill rate with first application; see Chemical Control Sheet

Biological control

any control operation must be preceded by a management plan for the site describing the conservation goals and methods of subsequent rehabilitation

5. **Legislation:** Napier Office files, Department of Conservation, 9 May 1904;
Napier Office files, 30 January 1924

6. **References:** Chris Van Kraynoord, Landcare, Palmerston North
Taupo willow control, Shore Reserves, Rob McLay, DOC, Turangi
Department of Conservation Willow Workshop, November 1993,
Hamilton (Carol West, DOC HO, Wellington)

7. **Other sources of information and current projects:**
Hans Rook, Department of Conservation, Napier, September 1992

8. **Contributors and Date of last revision:**
Hans Rook, Department of Conservation, Napier, September 1992

CHEMICAL CONTROL SHEET

Weed species common name: crack willow

User & Location	Chemical	Application Rate	Method of Application	Season of Application	Periodicity	Success Rating
Hans Rook, DOC, Napier	Ammate	100%	Cut and swab, drill holes, injectr 80cc per hole	Summer	Once	70-80%
DOC, Rotorua	Ammate		Drill hole, pour in ammate			10% kill
DOC, Rotorua	Escort	0.5 g/L	Ringbark, knapsack	December		'looks promising'

8. Growth and reproduction:

Breeding system

flowering type

method of pollination

other comments

Life cycle

type

flowering time November-January

fruiting time late summer - early autumn

other comments

Deciduous/evergreen evergreen

Age of reproduction

sexual

asexual

Life span (years)

Seed

production yes

dispersal birds

viability

germination

seed bank

Vegetative reproduction

Comments

9. Browsers and parasites:

10. General facilitation: spread by birds eating the large clusters of black drupes

11. Contributors and Date of last revision:

SMT, February 1994, compiled from: Flora of New Zealand volume IV and Porteous, T. 1993: Native forest restoration. QEII National Trust, Wellington

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** elder
Formal name: *Sambucus nigra*
2. **Illustration:** Porteous, T. 1993: Native forest restoration. QEII National Trust, Wellington
3. **Impact on biota and ecosystem**
 - Plant -plant relationships
can form pure thickets in ungrazed areas displacing native shrubs
 - Plant -animal relationships
stock occasionally poisoned by eating elder
 - Ecosystem
can be a useful nurse crop in some situations
 - Other
4. **Management:**
 - Hand control
 - Mechanical
 - Chemical control Roundup 1 % knapsack or brushgun, spray after flowering
 - Combination cut stump, frilling or injection, either 20% Roundup or 20% Tordon Brushkiller or undiluted Tordon 1.5 ml per cut or hole
 - Biological control
 - Other
5. **Legislation:** none
6. **References:**
7. **Other sources of information and current projects:**
8. **Contributors and Date of last revision:**
SMT, February 1994, compiled from: Flora of New Zealand volume IV and Porteous, T. 1993: Native forest restoration. QEII National Trust, Wellington

Selaginella kraussiana
selaginella

TAXON SHEET

1. **Common name:** selaginella
Family: Selaginellaceae
Formal name: *Selaginella kraussiana*
Synonym:
2. **Growth form:** herb
3. **Distribution:**
[abundance rating = low (l), medium (m), high (h) for present/potential infestation]
North Island and parts of the South Island (l-m/h)
4. **Habitat:** lowland
5. **Communities:** tall forest, low forest, scrub and forest margin
6. **Fertility:** moderate
7. **Response to environment:**

Response to

drought	intolerant
shade	tolerant
frost	intolerant?
poor drainage	tolerant

physical damage	resprout
grazing	
fire (plants, seeds)	
other	

Seedling requirements and tolerances

shade and moisture

Growth rates

seedlings	moderate
adults	moderate

8. Growth and reproduction:

Breeding system

flowering type spores
method of pollination
other comments

Life cycle

type
flowering time
fruiting time spores present all year round
other comments

Deciduous/evergreen evergreen

Age of reproduction

sexual 1 year?
asexual

Life span (years) eternal as it just keeps growing

Seed

production yes (spores)
dispersal wind
viability
germination
seed bank

Vegetative reproduction

by creeping stems with adventitious roots

Comments

9. Browsers and parasites:

10. General facilitation:

garden escape, fragments of stem have ground or aerial roots; spores spread by boots, stock, machinery

11. Contributors and Date of last revision:

Ewen Cameron, Auckland Institute and Museum, December 1990

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** selaginella
Formal name: *Selaginella kraussiana*
2. **Illustration:** Brownsey and Smith-Dodsworth 1989: NZ ferns and allied plants. Flora of New Zealand IV.
Porteous, T. 1993: Native forest restoration. QEII National Trust, Wellington.
3. **Impact on biota and ecosystem**
small, medium

Plant -plant relationships

forms mats in shady damp forest areas making it difficult for other small plants to grow in this habitat

Plant -animal relationships

Ecosystem

Other

4. **Management:**

Hand control hand pick or rake small areas

Mechanical

Chemical control 3% Roundup sprayed to actively growing plants by knapsack or brushgun

Combination

Biological control

Other prevent selaginella spreading to new areas by washing boots before moving to selaginella-free area

5. **Legislation:** none

6. **References:**

7. **Other sources of information and current projects:**

8. **Contributors and Date of last revision:**

Ewen Cameron, Auckland Institute and Museum, December 1990
additional information: Porteous. T. 1993 (see above)

Senecio mikanioides
German ivy

TAXON SHEET

1. **Common name:** German ivy
Family: Asteraceae
Formal name: *Senecio mikanioides*
Synonym:
2. **Growth form:** climber
3. **Distribution:** established locally throughout North, South and Stewart Islands
4. **Habitat:** coastal, lowland
5. **Communities:**
6. **Fertility:**
7. **Response to environment:**

Response to

drought

shade

semi tolerant

frost

poor drainage

physical damage

grazing

fire (plants, seeds)

other

Seedling requirements and tolerances

Growth rates

seedlings

adults

8. Growth and reproduction:

Breeding system

flowering type

method of pollination

other comments

Life cycle

type

flowering time (March) May - October

fruiting time

other comments

Deciduous/evergreen

Age of reproduction

sexual

asexual

Life span (years)

Seed

production

dispersal wind

viability

germination

seed bank

Vegetative reproduction

Comments

9. Browsers and parasites:

10. General facilitation: spread mostly by wind or carried by disturbances in the environment

11. Contributors and Date of last revision:

SMT, December 1993, compiled from; Flora of New Zealand volume IV

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** German ivy
Formal name: *Senecio mikanioides*
2. **Illustration:** Upritchard, E.A. comp. 1985: A guide to the identification of New Zealand common weeds in colour. New Zealand Weed and Pest Society, Hastings.
Porteous, T. 1993: Native forest restoration. QEII National Trust, Wellington.
3. **Impact on biota and ecosystem**
Plant -plant relationships
hinders plant growth by smothering and outshading; spreads over large areas of ground beneath forest preventing regeneration

Plant -animal relationships
poisonous

Ecosystem

Other
4. **Management:**
Hand control hard to remove because plant breaks when pulled; dig out

Mechanical

Chemical control readily killed with 1 % Roundup + 0.2% Pulse or Tordon Brushkiller or Grazon; Banvine at 180 ml per 15 L by knapsack; apply to actively growing plants

Combination

Biological control

Other
5. **Legislation:** none
6. **References:**
7. **Other sources of information and current projects:**
8. **Contributors and Date of last revision:**
SMT, December 1993, compiled from: Northland Conservancy DOC Weed Control Manual [no date]; Porteous, T. 1993 (see above)

Solanum mauritianum
woolly nightshade

TAXON SHEET

1. **Common name:** woolly nightshade
Family: Solanaceae
Formal name: *Solanum mauritianum*
Synonym: *Solanum auriculatum*
2. **Growth form:** shrub, small tree
3. **Distribution:**
[abundance rating = low (l), medium (m), high (h) for present/potential infestation]

North Auckland, Auckland (h)
Waikato (m)
Wellington (l)
Nelson City/ NW Nelson (l)

4. **Habitat:** lowland
5. **Communities:** scrub and forest margin, shrubland
6. **Fertility:**
7. **Response to environment:**

Response to
drought
shade
frost
poor drainage

physical damage resprout
grazing
fire (plants, seeds)
other

Seedling requirements and tolerances

Growth rates
seedlings
adults

8. Growth and reproduction:

Breeding system

flowering type

method of pollination

other comments

Life cycle

type

flowering time January - December

fruiting time

other comments

Deciduous/evergreen evergreen

Age of reproduction

sexual

asexual

Life span (years)

Seed

production yes

dispersal birds

viability

germination

seed bank

Vegetative reproduction

Comments

9. Browsers and parasites:

10. General facilitation:

11. Contributors and Date of last revision:

SMT, December 1993, compiled from: Waitakere City Council Pamphlet

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** woolly nightshade
Formal name: *Solanum mauritianum*
2. **Illustration:** Porteous, T. 1993: Native forest restoration. QEII National Trust, Wellington.
3. **Impact on biota and ecosystem**
medium

Plant -plant relationships
suppresses native plants

Plant -animal relationships
suspected of poisoning stock; irritant to skin, throat and eyes of humans

Ecosystem
4. **Management:**

Hand control

Mechanical

Chemical control spray all stems and foliage with any of the chemical solutions given on attached Chemical Control Sheet

Combination frill the trunk: about 150 mm above the ground make a continuous cut completely around the tree with downward axe strokes cutting well into the sap wood; saturate the frilled area with chemical solution within 15 minutes of making the cut stump treatment: cut down trees within 150 mm of the ground and paint immediately with liberal dose of chemical solution as given on Chemical Control Sheet
5. **Legislation:** class B target and widespread noxious plant in parts of the North Island and Waimea
6. **References:**
Blanco, H.G., Frattini, M.P. 1978: Weeds of Brazil -species of the nightshade family (Solanaceae). *Biologico* 44: 71-90.
Campbell, P.C., Staden, J. van 1983: Germination of seeds of *Solanum mauritianum*. *South African Journal of Botany* 2: 301-304.
James, T.K. 1981: Control of woolly nightshade. *Proceedings of the 34th New Zealand Weed and Pest Control Conference*: 141-143.
Little, E.C.S. 1980: Control of woolly nightshade by ring-barking. *Proceedings of the 33rd New Zealand Weed and Pest Control Conference*: 174-176.
7. **Other sources of information and current projects:**
8. **Contributors and Date of last revision:**
SMT, December 1993, compiled from: Waitakere City Council Pamphlet

CHEMICAL CONTROL SHEET

Weed species common name: woolly nightshade

User & Location	Chemical	Application Rate	Method of Application	Season of Application	Periodicity	Success Rating
Rod Smart, North Shore	Roundup	1% solution + 2% pulse	Gun or knapsack	All year		
	Amitrol	1% solution	Gun or knapsack	Oct-Feb		
	Roundup Network Ammate XL Tordon 50D, 24-D, 245-T	25% solution 100% solution 100% solution Mix with 20 parts diesel	Paint cut Paint cut Paint cut Paint cut			
	Tordon, Grazon	Mix with 5 parts diesel	Paint cut			Agitate mix during filling and use

Spartina alterniflora

American spartina

TAXON SHEET

1. **Common name:** American spartina
Family: Poaceae (Gramineae)
Formal name: *Spartina alterniflora*
Synonym:
2. **Growth form:** grass
3. **Distribution:**
[abundance rating = low (l), medium (m), high (h) for present/potential infestation]

Northland/Auckland (m/h)
Bay of Plenty (l/m)

4. **Habitat:** coastal
5. **Communities:** estuary
6. **Fertility:** high
7. **Response to environment:**

Response to

drought	intolerant
shade	intolerant
frost	unknown
poor drainage	tolerant
salt	highly tolerant

physical damage	resprout from underground rhizomes
grazing	resprout from underground rhizomes
fire (plants, seeds)	unknown
other	

Seedling requirements and tolerances

seedlings unknown in New Zealand

Growth rates

seedlings	medium growth rate by lateral spread
adults	medium growth rate by lateral spread

8. Growth and reproduction:

Breeding system

flowering type hardly ever flowers in New Zealand
method of pollination wind
other comments

Life cycle

type hardly ever flowers in New Zealand
flowering time seed not seen
fruiting time
other comments

Deciduous/evergreen evergreen

Age of reproduction

sexual
asexual

Life span (years) virtually limitless

Seed

production
dispersal
viability
germination
seed bank

Vegetative reproduction

considerable, from underground rhizomes

Comments

9. Browsers and parasites:

unknown

10. General facilitation: spreads entirely by vegetative spread; its distribution can be attributed to its popularity as a species to aid in estuarine reclamation

11. Contributors and Date of last revision:

T.R. Partridge, Landcare, Christchurch, January 1991

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** American spartina
Formal name: *Spartina alterniflora*

2. **Illustration:**

3. **Impact on biota and ecosystem**
medium

Plant -plant relationships

displaces *Zostera* by shading but mostly establishes on bare mud

Plant -animal relationships

considerable impact on invertebrate fauna

Ecosystem

unknown, but may have the same sediment trapping ability as *Spartina anglica*

Other

4. **Management:**

Hand control

it is not known whether control of this species has been attempted

Mechanical

Chemical control

Gallant 1% + 0.2% crop oil gives 80% kill but toxic to marine life;
Roundup 2% + 0.2% Pulse, avoid treating salt, silt laden plants, omitting
Pulse may give better results

Combination

Biological control

stock do eat American spartina, but not recommended as a control
strategy because rhizome fragments are likely to be transplanted
downstream

Other

5. **Legislation:** planting covered by Harbours Act

6. **References:** Franko, G.D. 1985: Report on the environmental implications of the
proposed herbicide spraying of *Spartina* in Waimea Inlet, Nelson
Province. Cawthron Institute, Nelson, Unpublished Report.
Franko, G.D., Asher, R.A., Gillespie, P.A., Keating, M.I., Stark, J.D. 1985:
Environmental impact assessment of the use of amitrole/dalapon
herbicide sprays to control *Spartina* grass in Waimea Inlet, Nelson.
Cawthron Institute, Nelson, Unpublished Report.
Partridge, T.R. 1987: *Spartina* in New Zealand, *NZ Journal of Botany*
25: 567-575, and references therein.

7. **Other sources of information and current projects:**

8. **Contributors and Date of last revision:**

T.R. Partridge, Landcare, Christchurch, January 1991

Spartina anglica spartina

TAXON SHEET

1. **Common name:** spartina
Family: Poaceae (Gramineae)
Formal name: *Spartina anglica*
Synonym:
2. **Growth form:** herb, grass
3. **Distribution:**
[abundance rating = low (l), medium (m), high (h) for present/potential infestation]

Auckland (l/l)
South Manawatu (l/m)
Nelson/Marlborough (l/m)
Canterbury (l/m)
Otago/Southland (m/h)

4. **Habitat:** coastal
5. **Communities:** estuary
6. **Fertility:** high
7. **Response to environment:**

Response to

drought	intolerant
shade	intolerant
frost	intolerant
poor drainage	highly tolerant
salt	highly tolerant

physical damage	resprout from underground rhizomes
grazing	resprout from underground rhizomes
fire (plants, seeds)	unknown
other	

Seedling requirements and tolerances

seedlings require only a short time without flooding to establish

Growth rates

seedlings

adults

rapid extension growth in ideal conditions; this species grows better the further south it occurs; in Northland it is hardly a problem, while in Invercargill it is a significant problem

8. Growth and reproduction:

Breeding system

flowering type hermaphrodite
method of pollination wind
other comments low set of seed

Life cycle

type perennial - clonal spread
flowering time December - March
fruiting time January - April
other comments

Deciduous/evergreen evergreen

Age of reproduction

sexual 1-2 years
asexual immediate

Life span (years) virtually limitless

Seed

production yes, very low (c.10% set)
dispersal gravity, water
viability drops rapidly
germination immediately after falling
seed bank none

Vegetative reproduction

clumps spread out at a rapid rate

Comments

this species owes its success to its rapid growth rate; it has a C⁴ photosynthesis mechanism

9. Browsers and parasites:

virtually none known

- 10. General facilitation:** this species has the reputation of being excellent for estuaries reclamation and therefore has been extensively planted for this purpose; clumps are often manually planted into estuaries and it has spread from these clumps

11. Contributors and Date of last revision:

T.R. Partridge, Landcare Research, Christchurch, January 1991

IMPACTS AND MANAGEMENT SHEET

- 1. Common name:** spartina
Formal name: *Spartina anglica*
- 2. Illustration:** Wilson, Hugh 1982: Stewart Island plants. Field guide publications, Christchurch. p412
- 3. Impact on biota and ecosystem**
large

Plant -plant relationships

displaces *Zostera* by shading, some invasion of salt marsh but usually establishes on bare mud

Plant -animal relationships

considerable effect on invertebrate fauna and on nesting sites for waders

Ecosystem

builds up considerable amounts of sediment, thereby altering the entire estuarine system; can cause flooding as a result

Other

4. Management:

Hand control

digging, care must be taken to remove all rhizomes

Mechanical

Chemical control

see Bascand, L.D 1968: *Proceedings of the 21st NZ Weed and Pest Control Conference*: 108 - 188.

Combination

Biological control

Other

- 5. Legislation:** covered by Harbours Act, which prevents planting of this species
- 6. References:** Partridge, T.R. 1987: *Spartina* in New Zealand. *NZ Journal of Botany* 25: 567-577 and references therein.
- 7. Other sources of information and current projects:**
- 8. Contributors and Date of last revision:**
T.R. Partridge, Landcare Research, Christchurch, January 1991

Tradescantia fluminensis
wandering Jew

TAXON SHEET

1. **Common name:** wandering Jew
Family: *Commeliaceae*
Formal name: *Tradescantia fluminensis*
Synonym:

2. **Growth form:** herb

3. **Distribution:**
[abundance rating = low (l), medium (m), high (h) for present/potential infestation]

Taranaki (h/m)
Wellington (h/h)
Canterbury (m/m)
Other parts of New Zealand: likely to be widespread around all towns throughout country

4. **Habitat:** lowland

5. **Communities:** tall forest, low forest, scrub and forest margin, cliff, bluff, riverbed

6. **Fertility:** moderate

7. **Response to environment:**

Response to
drought ?
shade tolerant
frost intolerant
poor drainage tolerant

physical damage resprout from shoot fragments
grazing highly palatable but resprouts from root fragments
fire (plants, seeds) ?
other

- Seedling requirements and tolerances
No seeds produced in New Zealand

- Growth rates
seedlings
adults can produce >1 kg dry matter m² in one year at 10% of full sunlight;
(Kelly & Skipworth, 1984: *NZ Journal of Botany* 22: 393-397)

8. Growth and reproduction:

Breeding system

flowering type

method of pollination

other comments apparently seed not set in NZ, reason unknown

Life cycle

type

flowering time November ->

fruiting time n/a

other comments vegetative reproduction only

Deciduous/evergreen evergreen

Age of reproduction

sexual n/a

asexual continuous

Life span (years) individual shoots probably only persist for 3-6 months but no exact data

Seed

production no

dispersal

viability

germination

seed bank

Vegetative reproduction

extensive - by adventitious roots on branching stems which become separated; succulent stems break extremely easily and are spread by water, stock and humans

Comments

vigorous vegetation growth smothers ground vegetation

9. Browsers and parasites:

no information; some grazing damage seen but animals not identified

10. General facilitation:

water, stock, humans, the latter through soil movement, pot plants, dumping in garden rubbish and possibly deliberate planting in some cases

11. Contributors and Date of last revision:

Dave Kelly, University of Canterbury, March 1991

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** wandering Jew
Formal name: *Tradescantia fluminensis*
2. **Illustration:** Upritchard, E.A. comp. 1985: A guide to the identification of New Zealand common weeds in colour. NZ Weed and Pest Control Society, Hastings.
Porteous, T. 1993: Native forest restoration. QEII National Trust, Wellington
3. **Impact on biota and ecosystem**
large

Plant -plant relationships

smothers low growing plants; prevents regeneration of taller plants

Plant -animal relationships

unknown

Ecosystem

large, can lead to non-replacement of forest

Other

4. **Management:**

Hand control

raking and piling up for removal, slow and inefficient as material remains to sprout

Mechanical

usually access for machinery difficult because in bush remnants

Chemical control

see attached Chemical Control Sheet

Combination

Biological control

grazing by cattle can be effective in reducing bulk, but care needs to be taken not to spread plants further

Other

5. **Legislation:** none
6. **References:** Kelly, D., Skipworth J.P. 1984: *Tradescantia fluminensis* in a Manawatu (New Zealand) forest: 1. Growth and effects on regeneration. *NZ Journal of Botany* 22: 399-402.
Kelly, D., Skipworth J.P. 1984: *Tradescantia fluminensis* in a Manawatu (New Zealand) forest: 2. Management by herbicides. *NZ Journal of Botany* 22: 399-402.
7. **Other sources of information and current projects:**
8. **Contributors and Date of last revision:**
Dave Kelly, University of Canterbury, march 1991

CHEMICAL CONTROL SHEET

Weed species common name: wandering Jew

User & Location	Chemical	Application Rate	Method of Application	Season of Application	Periodicity	Success Rating
Rod Smart, North Shore City Council	Glyphosate (Roundup, Newfarm)	200 mls/10 L water + 10 mls Pulse				
	Amitrole	200 mls/10 L water				
DOC Palmerston North	Roundup	3% solution, plus Multifilm	Knapsack	Spring	Once	Elimination
Jack Harper RD4, Waiuku	Preglone (contains Paraquat)	1%	Knapsack		Once	100% - spray whole plant or heap of raked up plant
A. Fillery, Warkworth	Weedazol 4L	Specified rate + Pulse	Knapsack, turn leaves over with spray head	Driest time of year	Once, except where damp	100% except in sheltered gullies where moisture is high

Ulex europaeus
gorse

TAXON SHEET

1. **Common name:** gorse
Family: Fabaceae
Formal name: *Ulex europaeus* L.
Synonym:
2. **Growth form:** shrub
3. **Distribution:** gorse is present throughout New Zealand and on the Chatham Islands; its distribution is recorded in the NZLRI; it is said to be present on 3.56% of NZ total land area, but seed may exist more widely than this; an estimated 166,000 ha has greater than 40% gorse cover
4. **Habitat:** coastal, lowland
5. **Communities:** scrub and forest margin, shrubland, fernland, riverbed
6. **Fertility:** low, low-moderate
7. **Response to environment:**

Response to

drought	tolerant
shade	intolerant
frost	tolerant
poor drainage	slightly tolerant

physical damage

grazing	resprouts from sub-epidermal and axillary buds
fire (plants, seeds)	plants can resprout from a well-developed lignotuber; see dormancy is broken by fire

other

Seedling requirements and tolerances

not tolerant of shading

Growth rates

seedlings	can reach 40 cm in one growing season; young plants can grow new shoots of 20-100 cm per annum depending on soil fertility and rainfall
adults	

8. Growth and reproduction:

Breeding system

flowering type	monoecious
method of pollination	insect pollinated
other comments	insignificant amounts of nectar, flowers are produced in spring when bees are seeking pollen

Life cycle

type	perennial
flowering time	flowers produced from February - October; in warmer climates peaks of flowering in April and September; in cooler climates almost all flowering occurs Sept - November
fruiting time	in warm climates, some seed is shed from mid-winter onwards, but most seed is shed from October - December
other comments	

Deciduous/evergreen evergreen

Age of reproduction

sexual	2-3 years
asexual	none

Life span (years) 18-30 years

Seed

production	yes, 500-1000/m ² /annum
dispersal	explosive, gravity
viability	a small proportion of seed can last for as long as 100 years, but significant amounts do not last beyond 30 years
germination	
seed bank	yes, seedbanks of 5000-17000/m ² have been measured; almost all is in the top 5cm of soil

Vegetative reproduction

will grow from cuttings but none in nature

Comments

9. **Browsers and parasites:** sheep browse soft new growth and flowers; goats eat all parts; at high densities, goats can destroy mature gorse; in the North Island gorse can be severely attacked by the stem borer *Oemona hirta* (Coleoptera: Ceambycidae); in Canterbury, gorse is often damaged by the native stem-girdling caterpillar *Anisoplaca ptyoptera* Meyricke (Lepidoptera: Gelechiidae); other insects are known to attack gorse but have less impact

10. General facilitation:

11. Contributors and Date of last revision:

R.L. Hill, Landcare Research, Christchurch, March 1991
J.M. Balneaves, NZFRI, Christchurch, March 1991

IMPACTS AND MANAGEMENT SHEET

- 1. Common name:** gorse
Formal name: *Ulex europaeus* L.
- 2. Illustration:** Keble, Martin, W. 1976: The concise British flora in colour. Ebury Press, London. Plate 21.

3. Impact on biota and ecosystem

Plant -plant relationships

gorse occurs in all open terrestrial habitats 800 m asl; it competes strongly and successfully with other vegetation in most of these; it regenerates slowly and overtakes imperfectly managed pasture; it out-competes newly planted trees in exotic forests and can destroy low-growing native habitats

Plant -animal relationships

bears robust spines which protect it from browsing by animals except goats; can be used as a living fence to contain stock and to provide shelter; a valued source of pollen for bees; one of the last mainland populations of the giant weta *Deinacrida* lives in gorse

Ecosystem

fixes nitrogen and causes rapid nutrient cycling; often forms monocultures which begin to senesce from year 15; in wetter habitats, and when seed source available, this can allow other species to overtake gorse; gorse can therefore act as an effective nurse crop for regenerating native forest; litter accumulation within bushes reduced throughfall and promotes fire

4. Management:

Hand control

Mechanical

Chemical control

many herbicides are registered for gorse control e.g. Amitrole, Ammate XL, Broadside, Escort, Reglone, Roundup, Tordon, Velpar, Weedazol, Nufarm, Grazon

Combination

Biological control

Apion ulicis (Forst) (Coleoptera: Apionidae) was released in 1931 and now destroys 5-95% of the seed set in spring; it does not attack seed set at other times of the year; *Tetranychus lintearius* Dofour (Acrari: Tetranychidae) was first released in 1989 and is now observed at release points but likely impact cannot yet be predicted; *Sericothrips staphylinus* Haliday (Thysanoptera: Thripidae) a foliage feeder; first released in late 1990; *Agonopterix ulicetella* Stainton (Lepidoptera: Oecophoridae) a foliage feeder, first released in late 1990; other potential control agents are under investigation. Goats? (Radcliffe 1990)

- 5. Legislation:** class B widespread noxious plants

6. **References:**
- Hill, R. 1986: Biological control of gorse: implications for the natural environment and for primary production. Entomology Division Report, DSIR, Christchurch.
- Hill, R.L., Sandrey, R.A. 1986: The costs and benefits of gorse. *Proceedings of the 39th NZ Weed and Pest Control Conference*: 70-73.
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- Ivens, G.W. 1978: Some aspects of seed ecology of gorse (*Ulex europaeus*). *Proceedings of the 31st NZ Weed and Pest Control Conference*: 53-57.
- Lee, W.G., Allen, R.B., Johnson, P.N. 1986: Succession and dynamics of gorse (*Ulex europaeus* L.) communities in the Dunedin Ecological District, South Island, New Zealand. *NZ Journal of Botany* 24: 279-292.
- MacFarlane, R.P., Grindell, J.M., Dugdale, J.S. 1992: Gorse on the Chatham Islands: seed formation, Arthropod associates and control. *Proceedings of the 45th NZ Plant Protection Conference*: 251-255.
- Popay, A.I., Rolston, M.P., Edmonds, D.K. 1985: "Non-Hormone" herbicide for gorse control. *Proceedings of the 38th NZ Weed and Pest Control Conference*: 94-97.
- Preest, D. 1980: Seasonal variation in seedling gorse susceptibility to four herbicides. *Proceedings of the 33rd NZ Weed and Pest Control Conference*: 165-169.
- Radcliffe, J.E. 1990: Gorse control by goats: effective strategies in Canterbury. In Bassett, *et al.*: Alternatives to the chemical control of weeds. *NZ Forest Research Institute Bulletin* no. 155.
7. **Other sources of information and current projects:**
8. **Contributors and Date of last revision:**
- R.L. Hill, Landcare Research, Christchurch, March 1991
- J.M. Balneaves, NZFRI, Christchurch, March 1991

Zazania latifolia Manchurian wild rice

TAXON SHEET

1. **Common name:** Manchurian wild rice
Family: Poaceae
Formal name: *Zazania latifolia*
Synonym:
2. **Growth form:** strongly rhizomatous
3. **Distribution:**
[abundance rating = low (l), medium (m), high (h) for present/potential infestation]

Kaipara District (h/h)
Whangarei District (l/h)
Rodney District (l/h)
Waikato District (l/h)
Wellington District (l/h)
other lowland wetlands (absent/h)

4. **Habitat:** coastal, lowland
5. **Communities:** riverbed, wetland
6. **Fertility:** moderate, high
7. **Response to environment:**

Response to

drought	tolerant
shade	intolerant
frost	tolerant
poor drainage	highly tolerant

physical damage	strong regrowth from underground rhizomes
grazing	strong regrowth from underground rhizomes
fire (plants, seeds)	strong regrowth from underground rhizomes
other	

Seedling requirements and tolerances

Growth rates

seedlings
adults

8. Growth and reproduction:

Breeding system

flowering type female inflorescence borne above mlae inflorescence
method of pollination wind
other comments

Life cycle

type long lived perennial spreading by rhizome extention and tillering
flowering time November-December
fruiting time February
other comments

Deciduous/evergreen evergreenn

Age of reproduction

sexual in cultivation plants flowered 1 year after cultivation
asexual

Life span (years) long lived

Seed

production yes
dispersal gravity, wind, water
viability some viability detected but % not known
germination
seed bank

Vegetative reproduction

tillering and rhizome extension

Comments

9. Browsers and parasites:

stock will browse young growth

10. General facilitation: mechanical drainage cleaning has spread this plant throughout Kaipara District; water movement spreads seed and floating rafts of this plant; plant has been deliberately spread in the past for stopbank stabilisation

11. Contributors and Date of last revision:

Paul Champion, NIWA, Hamilton, August 1992

IMPACTS AND MANAGEMENT SHEET

1. **Common name:** Manchurina wild rice
Formal name: *Zizani latifolia* Turcz.
2. **Illustration:** Upritchard, E.A. comp. 1985: A guide to the identification of New Zealand common weeds in colour. NZ Weed and Pest Control Society, Hastings
3. **Impact on biota and ecosystem**
 - Plant -plant relationships
Displaces other marginal species to deeper water; displaces all wetland species
 - Plant -animal relationships
 - Ecosystem decreases species diversity; destabilising effect on stopbanks, levees
 - Other
4. **Management:**
 - Hand control not feasible
 - Mechanical likely to spread rhizome material of this plant
 - Chemical control many trials conducted during last 30 years; some success using Galant, Zero, or try using Roundup or Delapon/Amitrole mixture but will not give permanent control
 - Combination
 - Biological control
 - Other shading trials using *Arundo donax*
5. **Legislation:** Class B target noxious plant in Whangarei District
6. **References:** Lambrechtsen, N.C. 1979: *MWD Internal Report 7*. Champion & Wells 1990: Report to Whangarei Regional Council.
7. **Other sources of information and current projects:**
chemical trials at Dargaville and Waikanae
internal reports held at Aquatic Plant Section, NIWA
8. **Contributors and Date of last revision:**
Paul Champion, NIWA, Hamilton, August 1992
Northland Conservancy Weed Control Manual [no date]

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APPENDIX 1

Filling out Weeds Database Forms

Instructions for TAXON SHEET

1. **Common name:** *use standard common name (refer to Table 2-4 in section 5)*
Family: *current scientific name*
Formal name:
Synonym: *previously used scientific name(s), where applicable*
2. **Growth form:** [herb, grass/woody herb/shrub/small tree/large tree/climber/other]
circle the relevant growth form
3. **Distribution:**
[abundance rating = low (l), medium (m), high (h) for present/potential infestation]
Give area of NZ and abundance rating for present/potential infestation in different parts of the country: e.g. Waikato (l/m)
4. **Habitat:** [coastal/lowland/montane/subalpine/alpine]
circle habitats in which weed occurs
5. **Communities:**
[tall forest/low forest/scrub and forest margin/shrubland/tall tussockland/short tussockland/herbfield/fernland/sand dune/cliff, bluff/riverbed/wetland/other]
circle habitats in which weed presents a problem
6. **Fertility:** [low/low-moderate/moderate/high]
circle fertility conditions under which weed grows
7. **Response to environment:**

<u>Response to</u>	<i>(e.g. intolerant, slightly tolerant, tolerant, highly tolerant)</i>
drought	<i>give tolerance rating for each individual condition</i>
shade	
frost	
poor drainage	
physical damage	<i>(e.g. death, resprout, new seedlings, underground rhizomes)</i>
	<i>(e.g. resprouts from broken branches)</i>
grazing	<i>(e.g. resprouts from base)</i>
fire (plants, seeds)	<i>(e.g. resprouts from underground rhizomes, seeds survive fire)</i>
other	

Seedling requirements and tolerances

Growth rates

- | | |
|-----------|---|
| seedlings | <i>(e.g. require high light conditions)</i> |
| adults | <i>(e.g. young plants and new shoots grow up to 2 m per year)</i> |

8. Growth and reproduction:

Breeding system

flowering type (e.g. *hermaphrodite, monoecious, protandrous*)
method of pollination (e.g. *wind*)
other comments (e.g. *flowers produce nectar*)

Life cycle

type (e.g. *perennial, clonal spread*)
flowering time (e.g. *December - May*)
fruiting time (e.g. *May - October*)
other comments

Deciduous/evergreen

circle one

Age of reproduction

sexual *months/years to reach reproductive age*
asexual *months/years*

Life span (years)

(e.g. *individual plants probably grow for more than 30 years*)

Seed

production [yes / no; quantity] *circle, give quantity*
dispersal [explosive, gravity/wind/water/man/vertebrates/invertebrates/other]
circle relevant mode
viability *length of time, season*
(e.g. initially high; 90% seed still viable at 40 days; but drops rapidly)
germination *(e.g. in spring, highest after winter chilling)*
seed bank *(e.g. seed dormant in soil for up to 5 years)*

Vegetative reproduction

(e.g. *regenerates from stem fragments, suckers*)

Comments

9. Browsers and parasites:

list species which graze or parasite weed

10. General facilitation: [mechanisms or spread]

(e.g. dumping garden rubbish, gravel, attached to animals, machinery, fragments moved by rivers, seeds carried by wind, establishment favoured by disturbance)

11. Contributors and Date of last revision:

(e.g. Peter Williams, Landcare Research, Nelson, November 1994)

Instructions for IMPACTS AND MANAGEMENT SHEET

- 1. Common name:** *use standard common name*
(refer to Table 2-4 in section 5: Future entries for the database)
Formal name: *current scientific name*
- 2. Illustration:** *give reference for source of illustration*
- 3. Impact on biota and ecosystem**
[small, medium, large, very large] *circle rating*

Plant -plant relationships

List plant species/communities affected and the nature of the weed's impact (e.g. scrambles, climbs, invades, competes with, smothers)

Plant -animal relationships

(e.g. food sources, habitat, hide predators, prickles, poisonous)

Ecosystem

(e.g. effects of weed on community biomass, nutrient cycling, frequency of fires)

Other

4. Management:

Hand control

(e.g. pulling, digging)

Mechanical

(e.g. using scrub cutter)

Chemical control¹

[chemical, application rate, method of application, season, periodicity, success]

(e.g. Roundup 2% sprayed from helicopter in spring when weed in full leaf. Follow up next autumn required to spray new seedlings. 70% of original infestation eradicated in initial spraying)

Combination

(e.g. cut vines in winter, spray regrowth the following spring)

Biological control

name organisms, origin, state of biological control programme

Other

(e.g. grazing, fire)

- 5. Legislation:** *give legal status of weed under the repealed Noxious Plants Act 1978 (e.g. noxious A, B, target, widespread), or under the Biosecurity Act 1993, whichever is applicable, see Introduction for further explanation.*
- 6. References:** *published work on ecology and control*
- 7. Other sources of information and current projects:**
People, agencies, research projects, control trials
- 8. Contributors and Date of last revision:**
(e.g. Paul Champion, NIWA, Hamilton, December 1994)

¹ If a variety of chemicals/methods have been trialed, please fill in the CHEMICAL CONTROL SHEET listing each successful and unsuccessful method trialed.

CHEMICAL CONTROL SHEET

Weed species common name: *use standard common name, refer to Tables 2-4 in section 5*

User & Location	Chemical	Application Rate	Method of Application	Season of Application	Periodicity	Success Rating
name person or contact re trial or management of operation	generic name, or brand of chemical	provide % or measures of chemical applied				give % kill rate; recommendation; if appropriate
<i>e.g. Harry Keys, DOC, Tongariro/Taupo</i>	<i>e.g. glyphosate, Roundup, Tordon</i>	<i>e.g. 2% Roundup + Pulse; Escort 35g per 100 L</i>	<i>e.g. knapsack, helicopter, paint cut stem</i>	<i>e.g. December and June</i>	<i>e.g. annually; once; every 6 months</i>	<i>e.g. 20% kill, not recommended; or 70% kill for saplings up to 2 m tall</i>

APPENDIX 2

Blank forms for supplying data to the Weeds Database

TAXON SHEET

1. **Common name:**
Family:
Formal name:
Synonym:

2. **Growth form:**

3. **Distribution:**
[abundance rating = low (l), medium (m), high (h) for present/potential infestation]

4. **Habitat:** [coastal/lowland/montane/subalpine/alpine]

5. **Communities:**
[tall forest/ low forest/ scrub and forest margin/ shrubland/ tall tussockland/ short tussockland/
herbfield/ fernland/sand dune/cliff, bluff/ riverbed/ wetland/ other]

6. **Fertility:** [low/low-moderate/moderate/high]

7. **Response to environment:**

Response to [intolerant/ slightly tolerant/ tolerant/ highly tolerant]
drought
shade
frost
poor drainage

physical damage [death/ resprouts/ new seedlings/ underground rhizomes]
grazing
fire (plants, seeds)
other

Seedling requirements and tolerances

Growth rates
seedlings
adults

8. Growth and reproduction:

Breeding system

flowering type
method of pollination
other comments

Life cycle

type
flowering time
fruiting time
other comments

Deciduous/evergreen

Age of reproduction

sexual
asexual

Life span (years)

Seed

production
dispersal
viability
germination
seed bank

Vegetative reproduction

Comments

9. Browsers and parasites:

10. General facilitation: (mechanisms of spread)

11. Contributors and Date of last revision:

IMPACTS AND MANAGEMENT SHEET

1. **Common name:**
Formal name:
2. **Illustration:**
3. **Impact on biota and ecosystem** [small/ medium/ large/ very large]
Plant -plant relationships

Plant -animal relationships

Ecosystem

Other
4. **Management:** [describes techniques trialed]
Hand control
Mechanical
Chemical control¹
Combination
Biological control
Other
5. **Legislation:**
6. **References:**
7. **Other sources of information and current projects:**
8. **Contributors and Date of last revision:**

¹ If a variety of chemicals/methods have been trialed, please fill in the CHEMICAL CONTROL SHEET listing each successful and unsuccessful method trialed.

CHEMICAL CONTROL SHEET

Weed species common name:

User & Location	Chemical	Application Rate	Method of Application	Season of Application	Periodicity	Success Rating