

Observations on Grasses in the Auckland Region

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Introduction

Grasses (Gramineae or Poaceae) feature prominently in the man-made or modified vegetation of the Auckland region, particularly in farm pastures, roadside verges, playing fields, racecourses, golf courses, and lawns. They are well adapted to grazing and mowing because new growth continually takes place below the leaf blades from the protected sheath-enclosed growing points at the base of the plant. Many grasses also occur as weeds of wasteland, cultivated soils, and disturbed sites, as components of maritime vegetation, and a few species are prominent in forest and forest fringes. The Auckland city hillscape — exemplified by the volcanic cones of North Head, Mt Eden, Mt Hobson, Mt St John, Mt Roskill, Mt Albert, One Tree Hill, Mt Albert, Mt Wellington, and Mangere Mountain — and many of the inner islands of the Hauraki Gulf — especially

Browns Island, Motutapu, Rakino, Motuihe, and Waiheke — owes much of its character to grass-covered slopes, which are green for much of the year, but brown in long dry summers, when the grass dries off.

Grasses rarely seem to have been locally or regionally surveyed in New Zealand. This paper records and discusses the indigenous, adventive, and cultivated grass species occurring in the region, defined here as the territory administered under the Auckland Regional Council (see Fig. 1), comprising the cities of Auckland (including most of the Gulf islands), Manukau, Waitakere, and North Shore, the whole of the districts of Rodney (including Kawau Island) and Papakura, and the northern half of Franklin district. Altogether there are some 203 grasses recorded from the region.

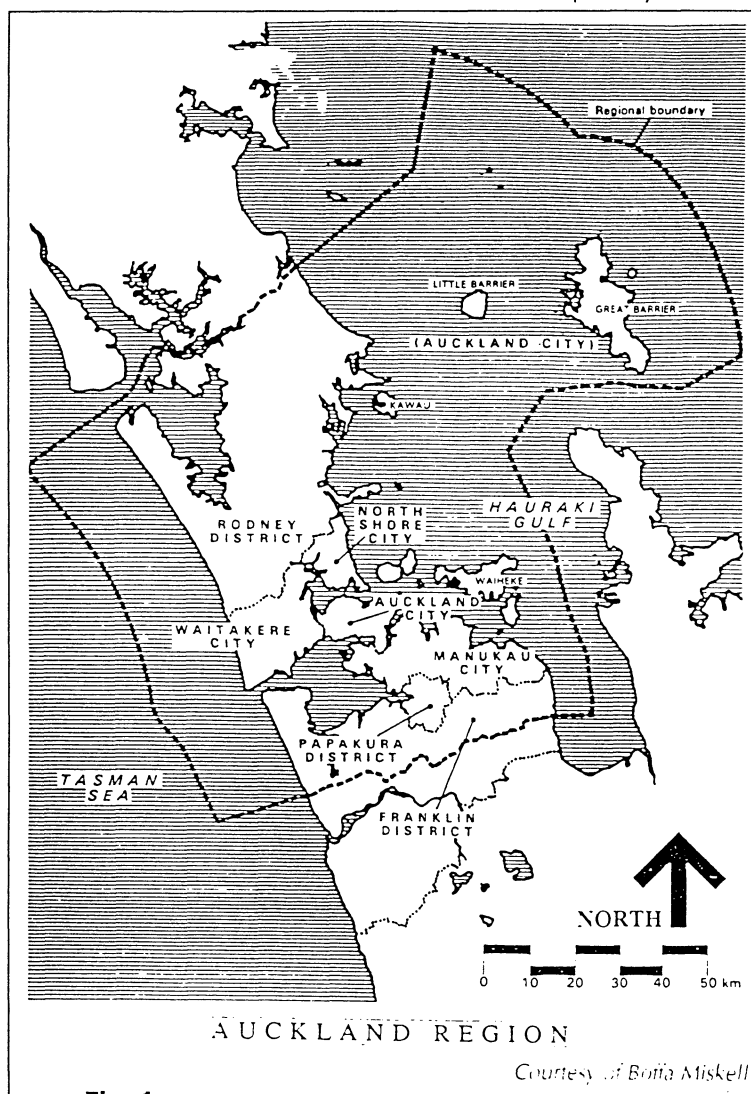


Fig. 1

Auckland's grass vegetation and flora is dominated by introduced species. There are no indigenous grasslands as such in the Auckland region, and comparatively few native species we have tend only to occur patchily or marginally in native bush (*Echinopogon ovatus*, *Micro-laena avenacea*, *M. stipoides*, *Opismenus hirtellus* subsp. *imbecillis*, *Poa imbecilla*, *Rytidosperma gracile*), on bluffs or coastal cliffs (*Cortaderia splendens*, *Lachnagrostis littoralis*, *Poa anceps*, *Trisetum arduanum*), in wetlands (*Isachne globosa*), in gumland scrub and roadside margins on sites of low fertility (*Deyeuxia quadriseta*, *Dichelachne crinita*, *D. inaequiglumis*, *Rytidosperma biannulare*), as a coastal turf on the West Coast (*Zoysia pauciflora*), in or adjoining salt marsh (*Austrostipa stipoides*, *Puccinellia stricta*), or on coastal sand (*Lachnagrostis billardierei*, *Spinifex sericeus*). The so-called "danthonia" grassland on dry grazing land of poor fertility may include some native species such as *Microlaena stipoides*, *Rytidosperma unarede*, *R. gracile*, *R. clavatum*), though the commonest of the danthonia-type grasses are usually the introduced *Rytidosperma racemosum* and *R. penicillatum*.

Growth of pasture grasses usually commences vigorously in late September, with the spring flush of the common introduced European grasses such as cocksfoot (*Dactylis glomerata*), sweet vernal (*Anthoxanthum odoratum*),

Yorkshire fog (*Holcus lanatus*), and perennial ryegrass (*Lolium perenne*). Annual poa (*Poa annua*) is a prominent winter grass, making most of its growth, flowering, and seeding from late autumn to spring (and it is also the dominant grass of golf greens in Auckland, maintained over the summer by regular irrigation). The annuals die towards the end of the year. At this time, the summer-green grasses become prominent, especially *Paspalum dilatatum*.

Some grasses have a long flowering season, examples being cocksfoot, Yorkshire fog, rye grass, sweet vernal, and particularly ratstail (*Sporobolus africanus*), which flowers from October through until July. Browntop (*Agrostis capillaris*) and crested dogstail (*Cynosurus cristatus*) flower relatively late (January), as do *Paspalum* and its relatives.

The summer-green grasses are most prominent from January through to mid-autumn (May), this group comprising *Paspalum dilatatum*, *Paspalum urvillei*, *Eleusine indica*, *Setaria glauca*, *Setaria gracilis*, *Bothriochloa macra*, *Axonopus fissifolius*, *Echinochloa crus-galli*, *Digitaria sanguinalis*, *Panicum dichotomiflorum* and *Panicum capillare*.

Grass habitats

Shaded forest or forest margins:

Brachypodium sylvaticum, *Critesion murinum* (under farm trees, especially macrocarpa), *Dactylis glomerata* (the most shade-tolerant of the common European pasture grasses), *Echinopogon ovatus*, *Ehrharta erecta*, *Entolasia marginata*, *Microlaena avenacea*, *Microlaena polynoda*, *Microlaena stipoides*, *Oplismenus hirtellus* subsp. *imbecillis*, *Rytidosperma gracile*.

Wet sites (freshwater): *Agrostis stolonifera*, *Alopecurus geniculatus*, *Glyceria declinata*, *Glyceria maxima*, *Isachne globosa*, *Paspalum distichum*, *Polypogon viridis*.

Wet sites (salt marshes, sand flats): *Agrostis stolonifera*, *Austrostipa stipoides*, *Catapodium rigidum*, *Cynodon dactylon*, *Critesion murinum*, *Elytrigia pycnantha*, *Hainardia cylindrica*, *Lachnagrostis filiformis*, *Parapholis incurva*, *Parapholis strigosa*, *Paspalum vaginatum*, *Polypogon fugax*, *Polypogon monspeliensis*, *Puccinellia stricta*, *Schedonorus phoenix*, *Spartina alterniflora*, *Spartina anglica*.

Coastal banks and cliffs: *Austrostipa stipoides*, *Bothriochloa macra*, *Chionochloa bromoides*, *Cortaderia fulvida*, *Cortaderia jubata*, *Cortaderia selloana*, *Cortaderia splendens*, *Elymus multiflorus*, *Lachnagrostis billardierei*, *Lachnagrostis littoralis*, *Poa anceps*, *Zoysia pauciflora*.

Coastal sands: *Austrofestuca littoralis* (Great Barrier Is.), *Aira caryophyllaea*, *Ammophila arenaria*, *Briza maxima*, *Briza minor*, *Bromus arenarius*, *Bromus diandrus*, *Lachnagrostis billardierei*, *Lagurus ovatus*, *Spinifex sericeus*, *Stenotaphrum secundatum*.

Roadsides and waste places (city): *Andropogon virginicus*, *Anthoxanthum odoratum*, *Arundo donax*, *Arrhenatherum elatius*, *Avena fatua*, *Bromus diandrus* (near sea), *Bromus lithobius*, *Bromus willdenowii*, *Cortaderia jubata* (bare ground) *Cortaderia selloana* (bare ground), *Echinochloa crus-pavonis*, *Holcus lanatus*, *Lachnagrostis filiformis*, *Lolium multiflorum*, *Lolium perenne*, *Nasella neesiana*, *Paspalum dilatatum*, *Paspalum orbiculare*, *Paspalum urvillei*, *Pennisetum latifolium*, *Phalaris aquatica*, *Phalaris canariensis*, *Phalaris minor*, *Piptatherum miliaceum* (city waste sections), *Polypogon fugax*, *Schedonorus phoenix*, *Setaria gracilis*, *Setaria pumila*, *Vulpia bromoides*, *Vulpia myuros*.

Forest edges and open, disturbed sites: *Briza maxima*, *Dichelachne crinita*, *Echinopogon ovatus*, *Gastridium ventricosum*, *Panicum dichotomiflorum*.

Gumlands: *Cortaderia jubata*, *Deyeuxia quadriseta*, *Dichelachne inaequiglumis*, *Eragrostis brownii*, *Lachnagrostis filiformis*, *Miscanthus nepalensis*, *Rytidosperma* spp., *Sieglingia decumbens*.

Pastures (poor, unimproved): *Agrostis capillaris*, *Anthoxanthum odoratum*, *Bothriochloa macra*, *Bromus hordeaceum*, *Lolium rigidum*, *Paspalum dilatatum*, *Pennisetum clandestinum*, *Poa trivialis*, *Rytidosperma racemosum*, *Sporobolus indicus*, *Vulpia bromoides*.

Pastures (good, improved): *Agrostis capillaris*, *Cynosurus cristata*, *Dactylis glomerata*, *Lolium perenne*, *Paspalum dilatatum*, *Poa trivialis*.

Cultivated soil, gardens, paths: *Cynodon dactylon*, *Digitaria sanguinalis*, *Echinochloa crus-galli*, *Ehrharta erecta*, *Eleusine indica*, *Elytrigia repens*, *Poa trivialis*, *Setaria gracilis*, *Setaria pumila*, *Setaria verticillata*, *Setaria viridis*.

Lawns, sportsfields, golf courses: *Agrostis capillaris*, *Agrostis stolonifera*, *Axonopus fissifolius*, *Lolium perenne*, *Microlaena stipoides*, *Paspalum dilatatum*, *Pennisetum clandestinum*, *Poa annua*, *Poa trivialis*.

Cultivated and semi-wild bamboos: *Bambusa balcooa*, *Bambusa multiplex*, *Bambusa oldhamii*, *Chusquea culeou*, *Dendrocalamus latiflorus*, *Himalayacalamus falconeri*, *Phyllostachys aurea*, *Phyllostachys nigra* var. *nigra*, *Phyllostachys nigra* var.

henonis,
japonica.

Pleioblastus auricomus,
Pseudosasa
Band',
Cymbopogon citratus,
Festuca glauca,
Hakonechloa macra,
Helictotrichon sempervirens,
Miscanthus sinensis var. *zebrinus*,
Phalaris arundinacea var. *picta*,
Pennisetum setaceum,
Piptatherum miliaceum,
Saccharum officinarum,
Setaria palmifolia,
Zea mays.

Cultivated and ornamental grasses: *Anemanthele lessoniana*, *Arundo donax* var. *versicolor*, *Avena sativa*, *Avena sterilis*, *Bouteloua gracilis*, *Chionochloa flavicans*, *Coix lacryma-jobi*, *Cortaderia selloana* 'Gold

Table 1: Flowering period of some common Auckland grasses

	SPRING 23 Sep-21 Dec				SUMMER 22 Dec-20 Mar			AUTUMN 21 Mar-20 June			WINTER 21 June-22 Sep		
	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
<i>Agrostis capillaris</i>													
<i>Alopecurus pratensis</i>													
<i>Anthoxanthum odoratum</i>													
<i>Arrhenatherum elatius</i>													
<i>Avena fatua</i>													
<i>Axonopus fissifolius</i>													
<i>Bothriochloa macra</i>													
<i>Bromus hordeaceus</i>													
<i>Bromus willdenowii</i>													
<i>Cortaderia jubata</i>													
<i>Cortaderia selloana</i>													
<i>Critesion murinum</i>													
<i>Cynosurus cristatus</i>													
<i>Dactylis glomerata</i>													
<i>Digitaria sanguinalis</i>													
<i>Echinochloa crus-galli</i>													
<i>Ehrharta erecta</i>													
<i>Eleusine indica</i>													
<i>Holcus lanatus</i>													
<i>Lolium perenne</i>													
<i>Microlaena stipoides</i>													
<i>Paspalum dilatatum</i>													
<i>Poa annua</i>													
<i>Poa trivialis</i>													
<i>Polypogon monspeliensis</i>													
<i>Rytidosperma racemosum</i>													
<i>Schedonorus phoenix</i>													
<i>Setaria pumila</i>													
<i>Sporobolus africanus</i>													

Note: *Poa annua* flowers throughout the year if sufficient moisture is available (e.g. on irrigated golf greens).

List of grasses found in Auckland

Note: Species marked * are very rare, or local, or known only from old herbarium specimens.
Species marked (cult.) are not wild in Auckland.

Bambusoideae			
<i>Bambusa balcooa</i>	'borak bamboo' (cult.)	<i>Cynosurus echinatus</i>	rough dogstail
<i>Bambusa multiplex</i>	xiaoshun, hedge bamboo (cult.)	<i>Dactylis glomerata</i>	cocksfoot
<i>Bambusa oldhamii</i>	Oldham's bamboo	<i>Deschampsia flexuosa</i>	wavy hairgrass
<i>Chimonobambusa quadrangularis</i>	square-stemmed bamboo (cult.)	<i>Deyeuxia quadriseta</i>	
<i>Chusquea culeou</i>	Chilean bamboo (cult.)	<i>Dichelachne crinita</i>	plume grass
<i>Dendrocalamus hookeri</i>	cult.	<i>Dichelachne inaequiglumis</i>	
<i>Dendrocalamus latiflorus</i>	giant bamboo (cult.)	<i>Dichelachne micrantha</i>	
<i>Himalayacalamus falconeri</i>	fountain bamboo	<i>Dichelachne rara</i>	
<i>Phyllostachys aurea</i>	walking stick bamboo	<i>Echinopogon ovatus</i>	forest hedgehog grass
<i>Phyllostachys nigra</i> var. <i>nigra</i>	black bamboo	<i>Elymus multiflorus</i>	blue wheat grass
<i>Phyllostachys nigra</i> var. <i>henonis</i>	henon bamboo	<i>Elymus rectisetus</i>	
<i>Pleioblastus auricomus</i>		<i>Elytrigia pycnantha</i>	sea couch
<i>Pleioblastus variegatus</i>		<i>Elytrigia repens</i>	couch
<i>Pseudosasa japonica</i>	arrow bamboo	<i>Festuca glauca</i>	blue fescue (cult.)
		<i>Festuca ovina</i> subsp. <i>hirtula</i>	sheep's fescue
		<i>Festuca rubra</i> subsp. <i>commutata</i>	Chewing's fescue
Ehrhartoideae		<i>Festuca rubra</i> subsp. <i>rubra</i>	red-fescue
<i>Ehrharta calycina</i>	perennial veldt grass	<i>Gastridium ventricosum</i>	nit grass
<i>Ehrharta erecta</i>	panic veldt grass	<i>Glyceria declinata</i>	glaucous sweet grass
<i>Microlaena avenacea</i>	bush rice grass	<i>Glyceria fluitans</i>	floating sweet grass
<i>Microlaena polynoda</i> *	knotted rice grass	<i>Glyceria maxima</i>	reed sweet grass
<i>Microlaena stipoides</i>	meadow rice grass, patiti	<i>Hainardia cylindrica</i>	barb grass
<i>Zizania latifolia</i>	Manchurian wild rice	<i>Helictotrichon sempervirens</i>	blue oat grass (cult.)
		<i>Hierochloa redolens</i> *	sweet holy grass, karetu
Pooideae		<i>Holcus lanatus</i>	Yorkshire fog
<i>Agrostis capillaris</i>	browntop	<i>Hordeum vulgare</i>	four-rowed barley
<i>Agrostis castellana</i>	dryland browntop	<i>Lachnagrostis billardiarei</i>	sand wind grass
<i>Agrostis stolonifera</i>	creeping bent	<i>Lachnagrostis filiformis</i>	New Zealand wind grass
<i>Aira caryophyllea</i> subsp. <i>caryophyllea</i>	silvery hair grass	<i>Lachnagrostis littoralis</i> subsp. <i>littoralis</i>	'coastal cliff wind grass'
<i>Aira caryophyllea</i> subsp. <i>multiculmis</i>	silver hair grass	<i>Lagurus ovatus</i>	hare's tail grass
<i>Aira praecox</i>	early hair grass	<i>Lolium rigidum</i>	'annual ryegrass'
<i>Alopecurus geniculatus</i>	kneed foxtail	<i>Lolium multiflorum</i>	Italian ryegrass
<i>Alopecurus pratensis</i>	meadow foxtail	<i>Lolium perenne</i>	perennial ryegrass
<i>Ammophila arenaria</i>	marram grass	<i>Lolium temulentum</i> *	darnel
<i>Amphibromus fluitans</i> *	water brome	<i>Nasella neesiana</i>	Chilean needle grass
<i>Anemanthella lessoniana</i>	New Zealand wind grass (cult.)	<i>Nasella tenuissima</i>	finestem needle grass
<i>Anthoxanthum aristatum</i>		<i>Nasella trichotoma</i>	nasella tussock
<i>Anthoxanthum odoratum</i>	sweet vernal	<i>Parapholis incurva</i>	sickle grass
<i>Arrhenatherum elatius</i> subsp. <i>elatius</i>	tall oat grass	<i>Parapholis strigosa</i>	slender barb grass
<i>Arrhenatherum elatius</i> subsp. <i>bulbosum</i>	onion twitch	<i>Phalaris aquatica</i>	phalaris
<i>Austrofestuca littoralis</i> *	beach fescue	<i>Phalaris arundinacea</i> var. <i>arundinacea</i>	reed canary grass
<i>Austrostipa stipoides</i>	coastal needle grass	<i>Phalaris arundinacea</i> var. <i>picta</i>	ribbon grass
<i>Austrostipa rudis</i> subsp. <i>rudis</i> *		<i>Phalaris canariensis</i>	canary grass
<i>Avena barbata</i>	slender oat	<i>Phalaris minor</i>	lesser canary grass
<i>Avena sativa</i>	cultivated oat	<i>Phleum pratense</i>	timothy grass
<i>Avena sterilis</i> subsp. <i>sterilis</i>	sterile oat	<i>Piptatherum miliaceum</i>	bamboo grass
<i>Brachypodium distachyon</i> *		<i>Poa anceps</i>	
<i>Brachypodium sylvaticum</i>	slender false brome	<i>Poa annua</i>	annual poa
<i>Briza maxima</i>	large quaking grass	<i>Poa cita</i>	silver tussock
<i>Briza minor</i>	shivery grass	<i>Poa compressa</i> *	flattened meadow grass
<i>Briza rufa</i> *		<i>Poa imbecilla</i>	
<i>Bromus arenarius</i>	sand brome	<i>Poa nemoralis</i> *	
<i>Bromus commutatus</i> *	meadow brome	<i>Poa pratensis</i>	Kentucky bluegrass
<i>Bromus diandrus</i>	ripgut brome	<i>Poa trivialis</i>	rough-stalked meadow grass
<i>Bromus hordeaceus</i>	soft brome	<i>Polypogon fugax</i>	perennial beard grass
<i>Bromus lithobius</i>	Chilean brome	<i>Polypogon monspeliensis</i>	annual beard grass
<i>Bromus racemosus</i> *	smooth brome	<i>Polypogon viridis</i>	water bent
<i>Bromus sterilis</i>	sterile brome	<i>Puccinellia stricta</i>	salt grass
<i>Bromus tectorum</i>	downy brome	<i>xSchedololium holmbergii</i>	hybrid ryegrass
<i>Bromus valdivianus</i>	stripey brome	<i>Schedonorus phoenix</i>	tall fescue
<i>Bromus willdenowii</i>	prairie grass	<i>Trisetum arduanum</i>	
<i>Catapodium rigidum</i>	fern grass	<i>Triticum aestivum</i>	wheat
<i>Critesion hystrix</i>	Mediterranean barley grass	<i>Vulpia bromoides</i>	vulpia hair grass
<i>Critesion murinum</i> subsp. <i>murinum</i>	barley grass	<i>Vulpia myuros</i> var. <i>megalura</i>	vulpia hair grass
<i>Critesion murinum</i> subsp. <i>leporinum</i>	meadow barley grass	<i>Vulpia myuros</i> var. <i>myuros</i>	vulpia hair grass
<i>Cynosurus cristatus</i>	crested dogstail		

Arundinoideae			<i>Digitaria ciliaris</i>	summer grass
<i>Arundo donax</i>	giant reed		<i>Digitaria ischaemum</i>	smooth summer grass
<i>Chionochloa bromoides</i>	'coastal tussock grass'		<i>Digitaria sanguinalis</i>	crab grass
<i>Chionochloa flavicans</i>	'bluff tussock grass' (cult.)		<i>Digitaria violascens</i>	
<i>Cortaderia fulvida</i>	toetoe		<i>Echinochloa crus-galli</i>	barnyard grass
<i>Cortaderia jubata</i>	pink pampas grass		<i>Echinochloa crus-pavonis</i>	Gulf barnyard grass
<i>Cortaderia selloana</i>	pampas grass		<i>Entolasia marginata</i>	bordered panic grass
<i>Cortaderia splendens</i>	coastal toetoe		<i>Isachne globosa</i>	swamp millet
<i>Rytidosperma biannulare</i>			<i>Miscanthus nepalensis</i>	Himalayan fairy grass
<i>Rytidosperma caespitosum</i>			<i>Miscanthus sinensis</i>	Chinese fairy grass
<i>Rytidosperma clavatum</i>	hairy danthonia		<i>Oplismenus hirtellus</i> subsp. <i>imbecillis</i>	'bush panic grass'
<i>Rytidosperma gracile</i>			<i>Panicum capillare</i>	witchgrass
<i>Rytidosperma laeve</i>			<i>Panicum dichotomiflorum</i>	smooth witchgrass
<i>Rytidosperma penicillatum</i>	danthonia slender wallaby grass		<i>Panicum huachucae</i>	
<i>Rytidosperma pilosum</i>	danthonia		<i>Panicum maximum</i> subsp. <i>trichoglume</i>	green panic
<i>Rytidosperma racemosum</i>	danthonia		<i>Panicum schinzii</i>	swamp panicum
<i>Rytidosperma tenuius</i>	danthonia		<i>Paspalum dilatatum</i>	paspalum
<i>Rytidosperma unarede</i>			<i>Paspalum distichum</i>	Mercer grass
<i>Sieglingia decumbens</i>	heath grass		<i>Paspalum orbiculare</i>	ditch millet
Chloridoideae			<i>Paspalum paniculatum</i> *	Russell River grass
<i>Bouteloua gracilis</i>	blue grama grass, mosquito grass (cult.)		<i>Paspalum urvillei</i>	Vasey grass
<i>Chloris gayana</i>	Rhodes grass		<i>Paspalum vaginatum</i>	saltwater paspalum
<i>Chloris truncata</i>	windmill grass		<i>Pennisetum clandestinum</i>	kikuyu grass
<i>Cynodon dactylon</i>	Bermuda grass		<i>Pennisetum latifolium</i>	Uruguay pennisetum
<i>Eleusine indica</i>	crowsfoot grass		<i>Pennisetum macrourum</i>	African feather grass
<i>Eragrostis brownii</i>	bay grass		<i>Pennisetum setaceum</i>	African fountain grass
<i>Spartina alterniflora</i>	America spartina		<i>Pennisetum villosum</i>	feathertop
<i>Spartina anglica</i>	spartina		<i>Saccharum officinarum</i>	sugar cane (cult.)
<i>Spartina x townsendii</i>	spartina		<i>Setaria gracilis</i>	knot-root bristle grass
<i>Sporobolus africanus</i>	ratstail		<i>Setaria palmifolia</i>	palm grass
<i>Zoysia minima</i>			<i>Setaria parviflora</i>	
<i>Zoysia pauciflora</i>	'coastal carpet grass'		<i>Setaria pumila</i>	yellow bristle grass
Panicoideae			<i>Setaria verticillata</i>	rough bristle grass
<i>Andropogon virginicus</i>	whisky grass		<i>Setaria viridis</i>	green bristle grass
<i>Axonopus fissifolius</i>	mat grass		<i>Sorgum bicolor</i>	grain sorghum
<i>Bothriochloa macra</i>	red-leg grass		<i>Sorgum halepense</i>	Johnson grass
<i>Coix lacryma-jobi</i>	Job's tears (cult.)		<i>Spinifex sericeus</i>	hairy spinifex
<i>Cymbopogon citratus</i>	lemon grass (cult.)		<i>Stenotaphrum secundatum</i>	buffalo grass
			<i>Themeda triandra</i> *	kangaroo grass
			<i>Urochloa panicoides</i>	urochloa grass

References on Grasses in Auckland

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Thomas Cheeseman's Field Notebooks

More excerpts, with reference to *Phylloglossum drummondii*

Bec Stanley

I have transcribed some of the entries in the field notebooks of Thomas Cheeseman, relating to Auckland and our threatened plants. The following excerpt comprises notes made by Cheeseman on Waikumete in West Auckland. It is interesting for me because of the reference to the threatened fern ally, *Phylloglossum drummondii*, as 'abundant'. There are no recent records of this species known from Auckland, and in fact it has disappeared from most of its former range, in the last century. It is classified as Endangered (de Lange et al. 1999). As with Cheeseman's trip notes for South Whau, where he also found this small lycopod (see ABSJ 53(2)), he mentions fires which completely devastate the

area. *P. drummondii* is a species which favours recently burned shrubland. This species is now restricted to Northland where it grows at five locations (Lisa Forester *pers. comm.*). It also grows in Australia where it occurs in parts of West Australia, South Australia, Victoria, New South Wales, and north-eastern Tasmania. It is not classified as threatened in Australia (Briggs & Leigh 1988). To preserve the original style of the notebooks Cheeseman's nomenclature is followed, new names or those currently in use, and my approximations are provided in [] thus *Panax anomalum* [*Raukawa anomalus*].

16 September Waikumete 1873 (from notebook 5 'Plants found in the North Island'):

"Few plants of interest are observed on the low clay hills between the Whau village and the debouchment of Henderson's creek into the

Waitemata. The vegetation has been so often burnt off that probably many species have been extirpated. Amongst the stunted tea-tree, *Pterostylis*