

# Wiwi - Knobby Club Rush

## the wonder plant of backdunes

### INTRODUCTION

Wiwi or knobby club-rush (*Ficinia nodosa*) is a rhizomatous perennial rush found in a wide range of habitats including coastal sand dunes. It has dark green round stems with a characteristic small dense seedhead near the sharp pointed tip of each stem.

Wiwi is native to Australia and New Zealand. In New Zealand it naturally occurs throughout the North and South Islands as well as Stewart Island, the Chatham Islands and the Kermadec and Three Kings Islands. The species is

not threatened. Its adaptability to a range of sites from coastal to montane is well known. It readily establishes on backdune sites as natural regeneration and has been planted by Coast Care groups in many regions throughout New Zealand.

This article provides a description of the characteristics and habitat of wiwi and emphasizes the importance of this species in the restoration of degraded coastal dunes throughout New Zealand.



## PLANT CHARACTERISTICS

Wiwi is a perennial rush forming clumps of dark green stems on long creeping rhizomes. It grows to between 30 and 90 cm in height depending on the degree of exposure. The stems are cylindrical usually with a slight tapering at both ends, smooth-surfaced and approximately 1.5-3 mm thick.



*Seedhead of wiwi and hence its name knobby club rush.*



*Flower of wiwi*

The flower has a dense rounded form 7-20 mm in diameter forming a few centimetres below the end of the sharp pointed leaf which protrudes past the flower head. Each flower develops into a knobby brown seedhead containing many dark brown to almost black nuts each about 1 mm in size. The white flowers of wiwi appear from September to December and fruits appear from November to May. The distinctive seedhead persists on many stems making the plant easy to recognise throughout the year.





## HABITAT

Wivi is found growing in mostly coastal areas throughout New Zealand but occasionally extends into montane areas up to 700 m a.s.l. The plant does best on open sunny sites with free draining soils and is found in a wide range of habitats, from periodically inundated edges of wetlands to drought-prone elevated dunes. On dunes, it prefers semi-stabilised sand and therefore typically occurs landward of the foredune zone dominated by sand binders, but can overlap with the landward edge of that zone. It is remarkably tolerant of a wide range of conditions from warm to cold temperatures and from exposed to sheltered sites.

Wivi occurs as scattered individual plants in mixture with other ground cover native species or can form extensive dense stands on sand dunes and around estuaries.



*Wivi often forms extensive dense stands on backdunes in many regions throughout the country.*

## RESTORATION OF BACKDUNES

### Nursery-raising wivi plants

Wivi is easily grown from freshly collected seed using standard nursery-raising methods. Seedheads are gathered by hand from stems in autumn. The seed is easily dislodged from dry seedheads by rubbing. The seed does not require cleaning before broadcast sowing over a seed raising mix. Once newly germinated seedlings are about 5 cm high, they can be pricked into small containers such as propagation cells, root trainers or larger containers. Within one year, and depending on size of container, plants will comprise 5-10 stems that are at least 50 cm in height.



*Wivi are easily raised in a range of container types and sizes within one year of sowing seed.*



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An alternative method for raising wivi is by dividing existing plants into several transplants. Divisions can be short sections of rhizome containing a few leaves or larger divided sections of the plant. These can be potted directly into containers and will be ready for transplanting to field sites within a few months depending on local growing conditions.

Typically, there is no need to use large container sizes. Restoration programmes have achieved excellent outcomes using Hilson Root Trainers or similar small container sizes. However, larger sizes may be appropriate where rabbit browsing is a serious issue.

### Field transplanting divisions

An alternative to nursery seedlings is to transplant divisions from nearby existing plants. This involves selecting transplants from a well-established stand of wivi, digging up part of a healthy plant using a spade, and cutting into several clumps. These clumps are then planted into open dune sites as soon as practical after lifting.

Size of transplant clumps can vary from a short section of rhizome with 6-10 stems attached to a 10 cm x 10 cm clod of roots and stems. The larger size transplants are likely to be more resilient to transplanting on exposed difficult sites and will develop into a larger plant quicker than smaller transplants comprising only short sections of rhizome.

*Wivi is easily transplanted as divisions cut from mature healthy plants. A spade is used to dig out part of the mature plant (a & b) which can be cut into 4 clumps (c) before transplanting directly into a bare sand dune area (d).*



a)



b)



c)



d)



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### Planting and use in backdune restoration

Wiwi is one of the most successful early native colonising species found in natural regenerating vegetation on open dune sites. It is also one of the easiest native plants to establish on backdunes. It is therefore one of the more widely planted natives within many backdune restoration programmes. There are many successful examples of Coast Care planting of wiwi on virtually all open semi-stable to stable landward dunes. High survival and good growth rates have been achieved with both nursery-raised seedlings (e.g. see Technical Article Case Study No.1 – *Restoring degraded urban sites. Case study: Eastern Coromandel*) and transplants from existing plants (refer to panel on Wellington backdune trial).

However, there are limits to the degree of sand movement that wiwi will tolerate. For instance, planting of wiwi should be avoided in the most seaward foredune zone dominated by sand

binding species such as spinifex (*Spinifex sericeus*) and pingao (*Ficinia spiralis*). Eroding dune faces, active blowouts, and other areas of substantial sand movement are also inappropriate sites for establishing wiwi.

Rather than planting scattered plants over a wide area, wiwi is typically planted quite densely (e.g. seedling spacing of 50 cm or less) – either in small groups or over larger areas. It is also commonly planted in companion with other woody species, particularly ground cover scramblers such as pohuehue (*Muehlenbeckia complexa*) and where it occurs, sand coprosma (*Coprosma acerosa*). Whether planted in small groups or over larger areas, dense colonies are commonly achieved within 1-2 years depending on plant spacing and companion planting.

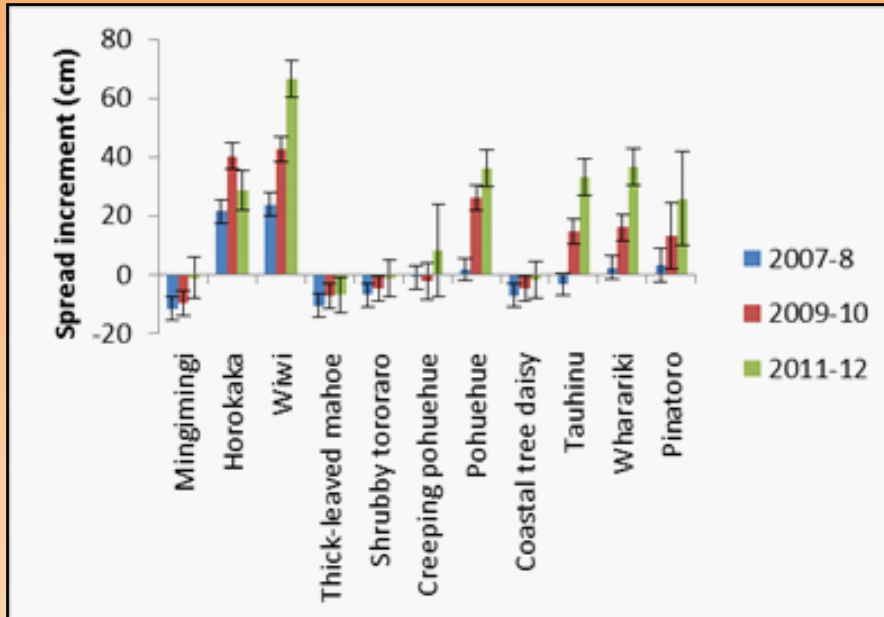
A planting trial of wiwi (below) being established on bare sand of a backdune to replace dense exotic species recently removed, Papamoa Beach, Bay of Plenty.





### Wiwi wins hands down on exposed Wellington harbour backdunes

On an exposed backdune site at Petone within the Wellington harbour wiwi proved to be the most successful of a range of locally native backdune ground cover and shrub species evaluated in a comprehensive planting trial (Bergin and Bergin 2012). There was 100% survival for wiwi with the fastest crown spread 5 years after planting compared to all other species (Figure 1).



**Figure 1:** Mean annual increment of crown spread of the 12 coastal native backdune species planted for up to 5 years on a highly exposed dune at Petone, Wellington harbour. Note the excellent growth of wiwi compared to all other locally native backdune species. Vertical bars indicate standard errors ( $P=0.05$ ).

In this trial wiwi were planted in small groups of eight plants with plants spaced about 50 cm apart. The vegetative spread of rhizomes resulted in the merger of plants to form a dense cluster (nearly 70 cm average lateral plant spread 5 years after planting). Plants are healthy and flowering and seeding despite the severe exposure of this backdune site.



*Wiwi was one of the most successful backdune species in a backdune planting trial on the exposed harbour site at Petone, Wellington.*



### EARLY SUCCESSIONAL PLANTING

Wivi is often amongst the few coastal native species to first colonise disturbed or newly established dune sites following initial stabilisation by the native sand binding species spinifex and pingao. With increasing sand stability wivi becomes established on backdune sites either as natural regeneration from nearby seed sources or from plantings, thus testifying to its adaptability as an early successional plant on a wide range of landward semi-stable dune sites.



*Wivi is one of the few hardy native plants regenerating on backdunes throughout New Zealand.*

### Facilitating natural succession

While wivi can form dense monocultures over large tracts of backdunes, it provides effective shelter for the establishment of a wide range other native coastal species both through encouraging natural regeneration and by planting nursery-raised seedlings. It is therefore an important species in facilitating natural successional recovery of native duneland vegetation.

Planting open exposed backdunes with a diverse range of coastal native ground cover, shrub and tree species too early has often resulted in large scale failure due to a range of factors including lack of shelter, weed invasion, rabbit browsing and disturbance from beach users. It is better to mimic natural successional recovery by first planting hardy species such as wivi to provide shelter and act as a protective ‘nurse’ for subsequent natural regeneration or establishment of less hardy species.

The height of wivi at up to 1 m and its propensity to spread by rhizomes also sees the species successfully surviving in the face of many of the aggressive exotic ground cover grass and herbaceous species that occur on backdunes. Once a dense cover of wivi is established, it also tends to suppress invasion by exotics species. Exotic perennial grasses can sometimes still invade where restoration is surrounded by lawns or pasture – but can be readily controlled with grass-specific herbicides that do not affect wivi.

*Wivi provides the initial cover of vegetation to allow natural succession of other native backdune species. In backdune restoration, wivi is one of the few hardy plants that can be used as ‘nurse’ for later planting of less hardy species.*





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### Companion planting

Some native ground cover and low growing species such as pohuehue, sand coprosma and sand daphne (*Pimelea villosa*) are notoriously difficult to establish on sand dunes even where natural populations commonly occur but where sites have often been compromised by human-induced disturbance. Planting trials with these species including larger-scale community planting has often failed on many sites.

Recent work in the Coromandel by local Coast Care groups and councils has found increased success with survival and early growth of pohuehue inter-planted with wiwi (refer to Technical Article Case Study No.1 – *Restoring degraded urban sites. Case study: Eastern Coromandel*). It appears the pohuehue is not only likely to be benefitting from the increased shelter of the wiwi but is also aided by the opportunity to climb over established plants of wiwi. Further work is underway evaluating the role of wiwi in companion planting to assist establishment of other difficult ground cover species like sand coprosma and sand daphne.

*Coromandel Coast Care groups and the Waikato Regional Council have successfully established pohuehue by inter-planting within recently established wiwi on exposed dune sites immediately landward of the spinifex-dominated foredune.*





There is scope to use wiwi in mixture with a wide range of other native ground cover species to provide a diverse dense cover of vegetation on backdunes where views are desired and there is limited scope to establish shrub and trees species.

### Diverse backdune communities

Along with pohuehue, sand coprosma and sand daphne, other low growing coastal native species that can be inter-planted with wiwi or that can be encouraged to regenerate naturally include New Zealand spinach (*Tetragonia tetragonoides*), speckled sedge (*Carex testacea*), oioi in wetter areas, and sand wind grass (*Lachnagrostis billardierei*) in more open sites.

A diverse plant community of the lower growing natives interspersed with small groups of taller hardy plants such as harakeke (*Phormium tenax*), toetoe (*Austroderia toetoe*) and tauhinu (*Ozothamnus leptophyllus*) provide options for establishment of a low dense cover of native dune vegetation where local constraints preclude establishment of a full sequence of coastal shrub and forest species (e.g. where development is too close to the sea).

On more landward dunes scope exists for establishing coastal native shrub and tree species where wiwi can provide the initial shelter for planted seedlings particularly on the more exposed coastal sites. This includes the native backdune shrub and trees species such as taupata (*Coprosma repens*) and houpara (*Pseudopanax lessonii*). These species will benefit from increased shelter when inter-planted in gaps within established wiwi that is also restricting access for rabbits for these relatively palatable species. Other native shrub and tree species that can be inter-planted include ngaio (*Myoporum laetum*), akeake (*Dodonaea viscosa*), pohutukawa (*Metrosideros excelsa*) and other locally native backdune species as outlined in previous articles of this Handbook.



### Wivi – a practical buffer along foredunes

Management of the zone between foredunes and grassed recreational areas on many of our most popular beaches can be challenging.

#### Controlling exotic grasses

Mowed grassed areas are dominated by aggressively spreading exotic species such as kikuyu (*Pennisetum clandestinum*) and buffalo grass (*Stenotaphrum secundatum*), particularly in warmer regions. These exotic species can extend seaward into the native sand binder zone, often significantly displacing native sand binders and narrowing the zone from landward. The narrowing or sometimes even total loss of the native sand binders can substantially degrade natural dune form and function by preventing the natural repair processes required for effective recovery and rebuilding of storm-damaged coastal foredunes (refer to Technical Handbook Article No. 2.2 – *Storm cut erosion and recovery* – which discusses the importance of these species).

Herbicide spraying is often the only practical option for controlling the spread of such exotic grasses into foredunes where grassed recreational reserves are located immediately landward of foredunes. However, the native sand binder spinifex is also vulnerable to grass-specific herbicides, complicating control.



#### Wivi as a buffer

One option that has been successfully implemented in the Waikato, Bay of Plenty and Northland regions is the use of non-grass species such as rush and sedge species established as a narrow buffer between the spinifex-dominated foredune and the grassed reserve. This allows the use of the grass-selective herbicide haloxyfop (Gallant™) for spraying along the edge of mowed grassed areas without spray coming into direct contact with the spinifex and other native foredune grass species such as sand wind grass.



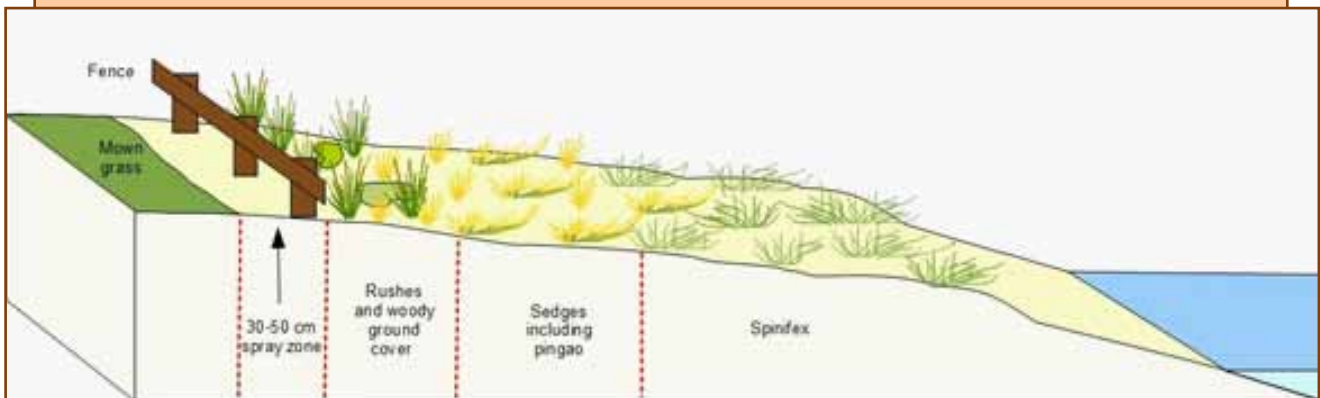


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Wivi in particular has been used effectively along with other rush species and sedges such as pingao and speckled sedge to provide this buffer between exotic and native grass species. A buffer dominated by wivi has been established for up to 10 years on a Mount Maunganui beach, Bay of Plenty, where kikuyu is prevented from invading the planted spinifex-dominated foredune by occasional spraying of the grass-selective herbicide along this buffer.



*Wivi along with other rush species and sedges can be planted as a useful buffer between foredune species dominated by spinifex and pingao that will allow herbicide spraying to prevent spread of exotic grasses from adjacent lawns and parks.*



*Non-grass species such as rushes (including wivi) and sedges planted as a buffer between spinifex-dominated foredunes and grassed reserve areas allow the use of grass-selective herbicides to prevent spread of exotic grasses seaward.*





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### REFERENCES

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*'To see the majority of New Zealand dunes restored and sustainably managed using indigenous species by 2050'.*