# Backyard Buffers

working *together* to care for *our* coast

in partnership with:

Environment Bay of Plenty

Western Bay of Plenty District Council

Tauranga City

Whakatane District

Opotiki District Council

Department of Conservation Te Papa Atawhai

Coast Care BOP Programme


**Coast Care Information Brochure Number 9**

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# Backyard buffers

Sand dunes are nature's way of buffering the land from the full force of the sea. Over the last seven years, Coast Care BOP has worked with local communities to plant native dune plants on the seaward face of the Bay of Plenty's sand dunes. **Backyard Buffers** is an initiative that focuses on strengthening the landward side of the dunes, the coastal reserve bordering private land. Usually forgotten, these back dunes are often full of weeds or have been converted into garden by the neighbouring landowner.

*Are the daisies improving the function of this dune?*

The **Backyard Buffers** programme gives residents an opportunity to help protect and, where necessary, further improve this buffer for the benefit of present and future generations.

This brochure is designed to help people who are working with Coast Care to plant the back dunes. It features plants that are native to the Bay of Plenty coast and have evolved over millennia to thrive in this very harsh, arid and nutrient poor environment.

You may be pleasantly surprised at the interesting colours and inherent textural beauty of many of these special plants, with leading landscapers now often using them to create trendy and natural-looking gardens.

**BUFFER:(n). A shock-absorbing device, a thing that lessens the impact of harmful effects.**

## An Important reminder

Backyard Buffers targets the back dune areas on coastal reserve land, often administered by the local district council, the Department of Conservation or an iwi/hapu. If your property borders this area, please respect the boundaries.

*Private occupation of public land*

Plants on the following list must be the **ONLY** ones used on our public coastal reserve areas, and then **ONLY** after discussion with the landowners, i.e. the local District Council, Iwi or Hapu, Department of Conservation, and/or with Coast Care. Please do not plant anything purchased from nurseries or home-grown, not even variegated forms of the plants below, as we can guarantee they will **NOT** be suitable, and they **will be removed** by the landowners. It is very important that we preserve the genetic integrity of these areas, to avoid any possibility of plants becoming weeds, and to ensure the best possible habitat for native creatures to again flourish on these lands.

However, be encouraged as plants from the following list, special fertiliser, and advice can be supplied to willing community members **completely free**; to help the restoration of this publicly owned land. Just contact Coast Care on the phone numbers at the back of this brochure if you require information and/or free plants.

# So be bold, and get involved!

## Watering plants

If severe dry periods occur following planting, plants may require some water (once per week maximum) in the first summer. They should then be left to grow naturally.

## Sand dunes buffer the land

Sand dunes in New Zealand were once regarded as troublesome areas, even gazetted by early Government agencies as "wastelands", largely because earlier destruction of the native sand-binding dune plants induced wind erosion on a massive scale around the country, through land clearance, fires and intensive grazing by farm animals, back in the 1800s.

*Himatangi Beach subdivision, 1978. Clearance of protective vegetation allowed persistent westerly winds to blow sand inland and erode section levels some 2 metres below the footpaths.*

*Photo courtesy of Dr. Jeremy Gibb, Coastal Management Consultancy Ltd*

The response, typical of the times was to choose Northern Hemisphere species like marram, lupin, and various pines to "cure" the problem. However, plants introduced from overseas do not always function as well as our native species and, more significantly, do not provide habitat suitable for many of our native insects, lizards, and birds.

Today, dune lands here in the Bay of Plenty are very fashionable real estate, with thousands of homes and baches built on them. The high cost of coastal property means owners have high expectations for these dunes to survive the worst that storms can throw at them, keeping their investment secure. (See Coast Care Information Brochure Number 2; *Formation and Functions of Beaches and Sand Dunes*).

Storms along our coast can be severe events. Cyclone Drena in 1997 produced waves up to 11m high, and the "Weather Bomb" in 2000 produced winds of 140 km/h. Coastal dunes are the **buffer** that have to absorb these very high-energy events, to protect the hinterland and then be ready to do it again and again during subsequent storms.

**"It's the volume of sand in a well vegetated dune that provides the best protection for the coastal environment."**

- Terry Healy, Research Professor of Coastal Environmental Science, University of Waikato

# Dunes help protect homes

Many coastal dwellings are located within this dune buffer area, with reserves beside their back yards, hence the name of this programme, the **Back Yard Buffers.** Through this programme, everybody has an opportunity to help protect, and where necessary, further improve this buffer for the benefit of present and future generations.

*Smethurst Family: Three generations planting Ohope beach coastal reserve backyard buffer.*
*Photo courtesy of Eastern Bay News*

The buffer must have two attributes:

1. Be wide enough to cope securely with the normal storm and calm weather cycles.

*Ohiwa 1976 erosion. The buffer here was too narrow to cope with natural processes.*

2. Be covered by the indigenous plant species that evolved to work in this harsh environment.

*Marine Parade buffer. Suitable width and natural vegetation offer sustainble security*

With the threat of global warming and potential sea level rise of between 30 to 50 cm over the next 100 years, it is even more important than ever to ensure that our dunes are able to function naturally.

The Back Yard Buffer project is designed to help in all these situations. The attractive and sometimes rare indigenous plants shown in this brochure hopefully will inspire people to look after their dune reserve areas:

1. By replacing invasive weeds and foreign species with suitable native plants.

2. To replant old encroachment areas with these superior plants.

3. To improve food and shelter opportunities for native insects and animals.

And of course to ensure that the protective buffer is in the best possible condition for the benefit of all who treasure our beautiful beaches, now and in the future

*Papamoa East beach "buffer"?*

## The plant list

The natural sequence of species on dunes is illustrated below, along with the zones that are a guide for the best location of the plant groups discussed. This guide is well researched, but by necessity is based on remnant plant populations in the region, as there are no complete examples of the original sequence left. Most of the species known to have existed are listed, but there are bound to be a few unintended omissions. Plant height estimation is an average **coastal** expectation, as exposure to salt laden winds can limit growth dramatically, even within the zones that plants would naturally occur.

## Dune plant sequence

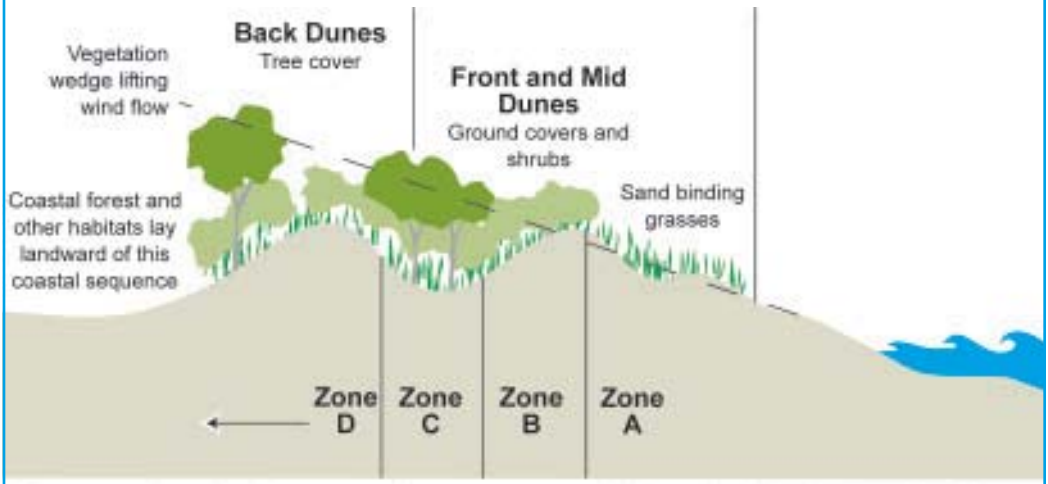


Diagram showing the vegetation sequence which probably characterised the most seaward coastal dunes of the Bay of Plenty region before human settlement (adapted from NSW Soil Conservation Service).

**Note:** In some parts of the Bay of Plenty coast, houses now occupy zones B, C and D and development excludes all native plants.

The plants in zone A are recovering from early grazing practices, but are now increasingly threatened by pedestrian and vehicle damage, thus impacting again on dune stability.

## Front slope of fore dune: Zone A

The plants in this zone are the **only** ones having the extremely specialised growth habits needed to survive, let alone flourish, in this, one of the most active, hostile and dynamic plant habitats in nature. These tough customers all possess incredible resistance to salt water inundation and regular smothering by salt spray, conditions that even make it almost impossible for weeds to grow!

Kowhangatara and pingao are the key sand binders that naturally maintain the volume of sand necessary to control erosion of our Bay of Plenty dunes and beaches. They have adapted to survive storm attack, and then to grow rapidly to trap sand and restore the dune again in calmer weather, before the next storm.

### 1. Kowhangatara, (Spinifex) *Spinifex sericeus* [60cm high]

An attractive silvery-green grass that rapidly colonises bare sand with long runners. Moderately resistant to grazing animals but the soft growing tips are easily damaged by trampling or vehicles. The “tumble-weed” seed heads are dispersed widely by the wind and also carried by water.

### 2. Pingao, *Desmoschoenus spiralis* [80cm]

This bronze-green sedge turns golden-orange in winter. A very efficient sand trapper with runners like Spinifex, but is readily damaged by grazing, and trampling. In the future some mature plants will have leaves (which dry to a beautiful gold colour) harvested sustainably for weaving and use in tukutuku panels (for Wharenui) and kete (small traditional baskets).

### 3. Hinarepe, (Sand tussock) *Austrofestuca littoralis* [60cm]

A light-straw coloured tussock that grows in attractive upright clumps, with golden seed heads. Only one small natural colony and a few scattered plants remain locally as grazing and burning has wiped out other populations throughout the Bay.

**4. Waiu-o-kahukura, (Shore spurge) *Euphorbia glauca* [80cm]**
This very elegant blue-green leaved sand trapping plant provides a total colour and textural contrast to the three above. Almost extinct in most parts of mainland North Island. Very palatable to grazing animals so can only be planted where rabbits etc are being actively controlled.

**5. Nihinihi, (Shore bindweed) *Calystegia soldanella* [10cm]**
This is a common low-growing plant on many beaches, with attractive bright green shiny leaves, and showy striped lilac and white flowers about 40 to 75mm across through summer. Leaves die down in winter (i.e. it is an herbaceous perennial).

**6. Carex, *Carex pumila* [10cm]**
A small creeping blue-green sedge that occurs locally, generally only on damp sites, or next to small streams.

## Backslope of fore dune: Zone B

The first of the shrubby plants grow in this slightly sheltered zone. On-shore winds are lifted slightly by these taller plants (up to 1.5m high), which helps to provide shelter for the plants further back. Leaf-drop and increasing shade help to supply organic matter to the sand, which, over many decades will improve soil structure and fertility.

Zone A plants above, plus;

**7. Tauhinu, *Ozothamnus leptophylla* [1.5m]**
The most salt-resistant of the shrubs, it will even grow on the crests of fore-dunes. Small silver-green leaves, and profuse small cream tufty flowers appear through summer, with a pleasant musk scent.

**8. Wiwi, (Knobby Clubrush) *Isolepis nodosa* [1m]**
A tough but architectural plant, with stout dark green stems, and brown seed clusters just below the pointed tips. Adapted to a wide variety of conditions, from exposed dune tops to wet hollows.

**9. Pohuehue, (Wire Vine) *Muehlenbeckia complexa and* Puka, *M. australis* [variable, from 0.3 to 1m]**
These wiry creeping plants can climb fences and shrubs, or stay growing close to the ground. The brown stems and bright green leaves contrast nicely. The Rauparaha Copper butterfly caterpillar depends on these plants for food, and pheasants enjoy the abundant silver berries in autumn and early winter.

**10. Horokaka, (NZ Ice Plant) *Disphyma australe* [15cm]**
This species is now uncommon on our dunes. The typically fleshy leaves are smaller than those of the more common introduced ice plant. Flowers are very showy and abundant right through summer, about 50 to 70mm across, and either cream or pink.

## 11. Tarakupenga, (Sand Coprosma) *Coprosma acerosa* [0.5 to 1.0m]

Often used by landscapers in gardens and traffic islands. The combination of orange/brown intertwining supple stems and narrow green leaves make this a very unique and desirable plant. Stunning translucent blue or silver berries in autumn. Now generally uncommon in our dunes, and very rare in the Eastern Bay of Plenty.

## 12. Perehia, (Sand Wind Grass) *Lachnagrostis billardierei* [40cm]

A native dune grass with outstanding fine gossamer-like seed heads coloured pink when young, that were used for dried arrangements when plants were more abundant.

## 13. Tutae koau, (Shore Celery) *Apium prostratum* [40cm]

Occurs rarely at scattered sites in the Bay of Plenty. This is a very tasty edible plant (like a mixture of salted celery and parsley), which probably explains its rarity. Flourishes in damp shady places, but is also growing naturally in full sun on a sandy beach near Te Kaha.

## 14. Kokihi, (Beach Spinach and NZ Spinach) *Tetragonia trigyna* & *tetragonioides* [10cm]

Both species have edible dark green fleshy leaves (much larger on NZ Spinach), stems often having a red blush, which along with the small yellow flowers and red berries provide good colour amongst other dune plants. Found only occasionally in the Bay of Plenty.

## Mid-dune zone: Zone C

Increasing amounts of organic matter and shelter from wind lifted by rising plant height provides some protection from salt-laden winds, allowing a wider variety of taller plants to inhabit this zone. Many of these plants produce succulent berries and other seeds, providing a rich food source for birds, insects and lizards.

Tauhinu, wiwi, pohuehue, tarakupenga, perehia and kokihi from above plus;

### 15. Carex, *Carex testacea* [35cm]

This very hardy and adaptable plant is frequently seen in reserves, traffic islands and increasingly in garden plantings. The flowing rich orange tussock-like foliage sways in the wind, and provides a very desirable appearance wherever it is encountered.

### 16. Taupata, *Coprosma repens* [2-3m]

The very shiny bright green leaves of this native plant are well known in many gardens globally, but it now occurs only locally on our dunes, although it would have formally been abundant. The numerous contrasting orange berries are attractive and great food for native birds and reptiles through summer/autumn.

### 17. Karamu, *Coprosma robusta* [3-5m]

Very similar in growth habit to taupata above, but with more pointed and less shiny leaves. Berry production is similar, making it another valuable food source for native creatures.

### 18. Toetoe, *Cortaderia fulvida* [1m leaves, 3m flowers]

Many people confuse this graceful dune inhabiting plant with the invasive pampas grass. It is smaller, less common and more elegant than pampas, and does not have the large accumulation of dead leaves that burn easily or harbour rats. Flowers in spring/early summer, compared to autumn for pampas, and is not a weed threat.

### 19. Oioi, (Jointed Wire Rush) *Apodasmia similis* [90cm]

Not a common plant on our dunes, preferring damp hollows; abundant on estuary margins. The stems move gently in the wind (oioi = shake gently), and are coloured from soft green to rich orange, depending on the environment they grow in.

### 20. Autetaranga, (Sand Daphne) *Pimelea arenaria* [20cm]

Only about six of these attractive plants remain on the mainland Bay of Plenty dunes, although greater numbers still occur on Matakana Island. Soft green foliage clothes this multi-stemmed low growing plant. They produce many small, orange centred, cream flowers in spring.

### 21. Ti kouka, (Cabbage Tree) *Cordyline australis* [Up to 12m]

Often considered to be a plant of wetland margins, these also grow naturally on dunes. The copious flowers are intensely fragrant, the berries are great bird food, and views out to sea through their open attractive habit are quintessential New Zealand.

**22. Mapou, *Myrsine australis* [3 – 4m]**
A very distinctive and attractive small tree, with red to brick-red branches and small soft green wavy-edged leaves. The leaves are often mottled with red or yellow spots. Now uncommon along our coast. Produces copious amounts of small black berries enjoyed by birds.

**23. Harakeke, (NZ Flax) *Phormium tenax* [Leaves 2m, flowers 3m]**
Stiff upright leaves, and red flowers on tall stalks that attract nectar-feeding creatures like birds, lizards, and bees (including native bee species). Seed pods are black. Adaptable, but best planted in damper dune hollows.

**24. Ngaio, *Myoporum laetum* [1m to 6m]**
Glossy, wavy waxy willow shaped leaves. The open habit makes it a good shade tree, and great for kids to climb. The 10mm white flowers with red or purple “freckles” attract many insects, and are followed by large numbers of small purple berries in autumn/winter.

**25. Kawakawa, *Macropiper excelsum* [1m to 3m]**
Very distinctive heart-shaped soft leaves with aromatic peppery smell. The numerous, nearly year-round, candle-shaped green fruit turn bright orange. This orange phase is seldom seen as the fruit is eagerly sought after by birds. Definitely prefers shade, but is also seen growing in open areas.

## 26. Mahoe, (Whiteywood) *Melicytus ramiflorus* [3m to 5m]

The thin bright green leaves are about 10–15cm long with a soft serrated edge, which produce the very fine "lace-like" skeletons often found in native forest. The bark is usually white, resulting in the common name. Produces prolific quantities of small violet-blue berries. Now uncommon on Bay of Plenty dunes.

## 27. Coastal mahoe *Melicytus novaezelandiae* [1m to 2.5m]

Leathery olive green leaves are an unusual colour for native plants, as is the multi-stemmed upright growth habit. Profuse small purple berries along the stems through autumn/winter. Usually an offshore island species (e.g. Matakana Island), but it has naturalised on dunes following recent plantings at the Mount, and therefore **MUST BE restricted to this area only**

## 28. Akeake, *Dodonaea viscosa* [1m to 4m]

Now uncommon on local dunes, and only the green-leaved form is indigenous here. The willow-shaped leaves are thin but with a rough surface, and almost glow when backlit. The light green winged seeds make a nice colour contrast to the leaves.

## 29. Hangehange, *Geniostoma rupestre var. ligustrifolium* [2m to 3m]

A bushy shrub that generally grows in shade, making it a useful specimen for that situation. The small pointed light-green leaves are quite soft to the touch. Common in forests, but like many other shrub species it is now rare on the coast due to habitat destruction. The numerous pale green flowers have an unusual musky-lemon scent.

### 30. Karo, *Pittosporum crassifolium* [2m to 5m]

A popular small tree in gardens. Seeds spread by birds are resulting in natural establishment of seedlings in some dunes. Leaves are similar to pohutukawa. The deep crimson velvety flowers appear in early spring, with a delightfully sweet nocturnal scent.

### 31. Mingimingi, *Leucopogon fasciculata* [1m to 4m]

The growth habit and thin linear leaves are both similar to manuka, but without the aromatic leaf smell. Drooping racemes of white flowers (in bud in this photo) bloom from early spring through to December, followed by numerous bright red 4mm berries. Very rare now on beaches.

### 32. Houpara, (Coastal Fivefinger) *Pseudopanax lessonii* [2m to 5m]

Leathery glossy leaves usually arranged in 3-5 “fingers”, with toothed edges. Quite versatile as it will grow in the open or under trees. Produces copious small black berries most of the year that are attractive to birds, and hence it is self-seeding in dunes near existing specimens.

### 33. Whauwhaupaku, (Fivefinger) *Pseudopanax arboreus* [up to 6m]

Similar to houpara (above), but with larger, more leathery leaves having more serrations on the edge. This small tree generally grows larger in all respects compared to houpara.

## Back-dune zone: Zone D

This is the mature forest zone, on older back-dune sands or shingle where sufficient organic matter and shelter allow these taller plants to flourish.

Taupata, karamu, toetoe, ti kouka, harakeke, ngaio, kawakawa, mahoe, akeake, hangehange, karo, houpara, pohuehue, mapou and whauwhaupaku from above plus;

**34. Koromiko, *Hebe stricta* [1.2m]**
The long soft green leaves with a toothed margin, and abundant soft blue/white flowers make this a great addition to any landscape. Few now remain in our dunes.

**35. Wharangi, *Melicope ternata* [2m to 6m]**
Striking lime-green glossy and wavy leaves that have a lemon scent when crushed (it is related to citrus). The small green fragrant flowers in early spring (attractive to bees) mature to many shiny black seeds through spring/summer, contrasting nicely with the leaves.

**36. Manuka, *Leptospermum scoparium* [up to 2m]**
This plant is well known to gardeners, but again, is now very uncommon in our dune areas. Where it is found, it seems to favour open exposed sites where it is often wind-shorn. The numerous usually white flowers are produced over an extended period from spring to late autumn, providing a nectar source for a range of creatures.

## 37. Kanuka, *Kunzea ericoides* [up to 12m]

The small aromatic leaves and profuse small white flowers (which attract many insects, especially native bees) are smaller than manuka, whereas the tree itself is many times larger, with stout trunks and branches. Very rarely found on dunes now, and where exposed to the elements remain very stunted, often only 1 or 2m high (e.g. Torere Beach).

## 38. Kanuka (Thornton), *Kunzea species (unnamed)* [up to 6m]

This kanuka, indigenous to the Thornton area, is nationally unique and specific to this 20km of dune. The candelabra, bonsai-style form persists even when grown inland, and so is now recognised as a separate species, as yet unnamed. This Kunzea species should **ONLY** be planted along the dunes adjacent to the Rangitaiki Plains, as it does not occur naturally anywhere on mainland New Zealand outside this geographical area.

## 39. Whau, *Entelea arborescens* [2m to 5m]

The very large, distinctive, heart-shaped soft leaves up to 250mm long give this small tree a distinctly tropical appearance. The large clusters of yellow centred white flowers each up to 30mm across are very attractive, both to humans and insects. Only about 4-6 plants left on the Bay of Plenty dunes, probably as the leaves are relished by stock.

## 40. Pohutukawa, *Metrosideros excelsa* [3m to 20m]

No Bay of Plenty beach is complete without these beautiful iconic trees. They can grow more seaward than this zone, and now cattle droving has stopped, seeds are germinating and growing naturally on rotting driftwood near dune crests (Zone B). The lower branches of tall trees can be trimmed for great views through them, **and** for people shade in hot summers. The bountiful, nectar-laden crimson flowers provide nutrition for vast numbers of native creatures, including lizards.

**41. Puriri, *Vitex lucens* [10m to 20m]**

The “food tree of the forest” is also locally common on parts of our coast. The shining dark green slightly “blistered” looking leaves provide a great contrast to the abundant 25mm long soft-red nectar-laden flowers produced through most of the year, as are the 20mm succulent (to birds) berries, hence the “food tree” name tag.

**42. Karaka, *Corynocarpus laevigatus* [10m to 15m]**

Glossy, thick dark green leaves provide a great contrast to the large bright orange berries in summer/autumn (with poisonous kernels). A round-headed tree which looks similar to a large magnolia. The leaves are reasonably salt tolerant.

**43. Kohekohe, *Dysoxylum spectabile* [10m to 15m]**

The very large glossy leaves are made up of 3-4 pairs of leaflets. Long panicles of attractive flowers (up to 40cm long) are produced in autumn, emerging, unusually, directly from the trunk. Flowers are seldom seen however, as possums eat them voraciously.

*Some people still use dunes as a rubbish dump, whether for garden waste or old concrete, as in this photograph.*

## Weed threats

Weeds can compete with, and even threaten survival of some native species in dunes. The harsh environmental conditions mean the range of damaging weed species is limited, but their effects can be severe. The weeds (pest plants) below are the most damaging species currently found in dunes, presented in decreasing order of potential for harm. For more information on controlling these plants, please contact your local Pest Plant Officer from Environment Bay of Plenty or District Council Reserves Officer.

### A. Evergreen buckthorn, *Rhamnus alaternus* [2m to 5m]

Confined to the Tauranga District thus far. Grows vigorously in either sun or shade, on dunes or inland, often overwhelming and destroying neighbouring plants. Easily mistaken for some native species (e.g. pohutukawa, Pittosporum) due to the variably shaped dark green leaves. Copious seeds are spread by many species of birds. Auckland Regional Council have allocated $3 million just to control spread in that city and coast. We must control further spread here before it is too late. Swabbing freshly cut stumps with a suitable herbicide is the most effective method.

### B. Pampas grass, *Cortaderia selloana & C. jubata.* [Up to 4m]

Pampas is now more common than the similar (native) toetoe due to the large volumes of wind dispersed seed. As discussed on page 14, pampas is a much larger plant than toetoe, with leaf edges that will cut skin more easily. Otamarakau has the largest stand of pampas on the coast, and Whakatane District Council, using Environmental Enhancement Funds, are controlling this infestation. Herbicide control is standard practice, but we will trial using salt, see kikuyu.

**C. Kikuyu, *Pennisetum clandestinum,* [Normally about 30cm]**

An invasive grass, with long runners that can smother native plants. Often found in areas extensively modified by humans. Control is desirable because kikuyu does not trap blowing sand as effectively as the native species. Salt-water tolerance is less than native front dune plants, which will be tested in trials using granular salt to control this weed amongst more desirable species.

**D. Lupin, *Lupinus arboreus* [Up to 3m]**

This Californian native was introduced to assist the growth of pine forests, for early control of dune erosion. Lack of natural control organisms in NZ meant lupins flourished and overwhelmed remaining natives. The natural arrival of a wind borne fungus (lupin blight in 1986) caused a significant reduction to lupin populations. Control is important as our native plants maintain the dune buffer in a far superior manner. Hand pulling or swabbing freshly cut stumps with a suitable herbicide are the most effective methods.

**E. Moth plant, *Araujia sericifera* [Climbing vine, up to 10m]**

The invasion potential of this plant means control of any existing ones is important. It is relatively common in Tauranga, but also starting to appear in Whakatane. Copious light, silky, wind borne seeds are released from the pear shaped pods late winter. It has poisonous milky sap that bleeds from any damaged parts; so protective gloves should be worn if pulling plants by hand, with ripe pods placed carefully in a bag for disposal.

### F. Bushy asparagus, *Asparagus densiflorus*; Smilax, *Asparagus asparagoides* [vines]

These plants are both difficult to control due to the many belowground tubers. Both also produce small red berries containing up to nine seeds each, which are spread by birds. Bushy asparagus should be handled with care as it contains many hidden thorns. Apart from human harm, smothering and displacement of native species are the reasons for control being necessary. Herbicide spraying is the current practice, but salt application will be trialled.

### G. Japanese spindle tree, *Euonymus japonicus* [up to 7m]

This evergreen shrub is spreading into dunes from home gardens, by birds spreading the numerous orange coloured fruit. The garden plants often have yellow variegated leaves, but seedlings revert to green. Spread of these shrubs is not as rapid as evergreen buckthorn, but there are enough seedlings emerging to warrant control being undertaken, before the population is overwhelming. Swabbing the freshly cut stump with a suitable herbicide is the most effective method.

## Other titles in this information series are:

No. 1 Bay of Plenty Coast Care
No. 2 Formation and Functions of Beaches and Sand Dunes
No. 3 Foredune Vegetation
No. 4 Dune Usage
No. 5 Coastal Plants - Pingao
No. 6 Coastal Plants - Spinifex
No. 7 Control of Vehicle Damage in Sand Dunes
No. 8 Sand Ladders - Getting you to the Beach
No. 10 Coast Care Code

## References:


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2. NIWA COASTAL and STORM HAZARDS, Abstracts of Presentations, March 2002. Climate Change Impacts on Coastal Margins: Rob Bell, Terry Hume.


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