

Agapanthus in New Zealand

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Fig. 1 Mass planting of a white-flowered *Agapanthus* cultivar. Photo: Murray Dawson.

Agapanthus must surely be one of the most widely recognised plants in New Zealand.

The widespread tall-growing and blue- (sometimes white-) flowered *Agapanthus* in New Zealand is known under the common names agapanthus, African lily and lily of the Nile.

Its botanical name is *Agapanthus praecox* subsp. *orientalis* (= *A. orientalis* in Healy and Edgar, 1980). Although several species, subspecies and hybrids of *Agapanthus* are cultivated in New Zealand (Box 1), *A. praecox* subsp. *orientalis* is by far the most common in this country and numerous cultivars have been derived from it (Appendix 1).

The evergreen, perennial growth habit, showy flowers and long flowering season of *A. praecox* subsp. *orientalis* have made it popular for mass plantings in herbaceous borders, along driveways and roadside banks and on traffic islands

throughout cities and towns of New Zealand.

Agapanthus flourishes in coastal, frost-free (or lightly frosted) temperate climates and are tolerant of a wide range of soil types and growing conditions – from dry exposed environments to damp, lightly-shaded sites.

This article discusses the introduction, cultivation and naturalisation of *Agapanthus* in New Zealand. Because of concerns around the weediness of tall-growing wild-type *Agapanthus*, we focus on the popular 'eco-friendly' low-growing cultivars and outline our fertility assessments of them.

Early garden records

Early newspapers (e.g., <http://paperspast.natlib.govt.nz>) and gardening magazines record that *Agapanthus* was first cultivated in New Zealand from about the mid-1800s as an ornamental garden plant (e.g., *Lyttelton Times*, Vol. VI, Issue 332, January 5, 1856, p. 5; *Lyttelton*

Times, Vol. VI, Issue 351, March 12, 1856, p. 6; *Wellington Independent*, Vol. XIX, Issue 2146, December 27, 1864, p. 3; *Marlborough Express*, Vol. XI, Issue 785, February 2, 1876, p. 6; *Otago Witness*, Issue 1364, January 19, 1878, p. 20; *Evening Post*, Vol. XIX, Issue 97, April 28, 1880, p. 4; *Otago Witness*, Issue 1657, August 25, 1883, p. 7; *Marlborough Express*, Vol. XXV, Issue 226, October 5, 1889, p. 3; *Otago Witness*, Issue 2082, January 18, 1894, p. 4; *Star*, Issue 5196, March 2, 1895, p. 7; Mason, 1896; *The City Beautiful*, November 30, 1934, p. 6; *New Zealand Gardener*, August 1, 1947, p. 652).

Cultivars of *Agapanthus*

Agapanthus: a revision of the genus (Snoeijer, 2004), arguably the most comprehensive book on the genus, lists 625 cultivars worldwide. These are derived mainly from evergreen species and subspecies, and particularly from *A. praecox* subsp. *orientalis*. However, cultivars are derived from other taxa and

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through hybridisation between them. For example, *A. praecox* subsp. *minimus* and the deciduous species *A. inapertus* have been important parents. Exact details of the parentages of many cultivars are unknown, complex or only partially recorded.

About 70–85 cultivars of *Agapanthus* have been available from the New Zealand nursery trade and many have originated in this country (Appendix 1).

Cultivars are evergreen or deciduous. They range in stature from about (100–)200 to 500 mm for the low-growing (so-called ‘dwarf’) selections; from 600 mm to 1.2 m for medium-sized selections; and up to 1.8(–2) m, including flower stems, for the tallest cultivars.

Their strap-like leaves are usually green or with a blue-green waxy (glaucous) surface, and sometimes with a purple base; other cultivars have green leaves with white or yellow variegation.

Flower colours of the cultivars are in numerous shades of violet, blue, lavender and purple, with several white-flowered selections (Fig. 1). Most have flowers with six tepals, although there are a few semi-double selections with additional tepals. Snoeijer (2004) arranged cultivars in several groups including those with funnel-, trumpet-, salver-, and tubular-shaped flowers.

Despite the range of variation described above, many of the medium-sized, non-variegated, blue-flowered selections are rather similar to one another.

Vegetative propagation, usually through division of their rhizomes, is the best method to maintain uniformity of the numerous *Agapanthus* cultivars (Duncan, 1998; van Dijk, 2004). Tissue culture is well suited for mass production but may produce some variation within *Agapanthus* lines; Snoeijer (2004) cites a figure of 3–5% instability when they are micropropagated.

Offering named cultivars as seed is poor practice and can create variation that undermines the integrity of the cultivars, resulting in several different plant lines under the same cultivar name. As Snoeijer (2004) and van Dijk (2004) note, *Agapanthus* is easy to grow from seed which is why nurseries extensively offer seed-propagated material as cultivars, and this is also true in New Zealand.

Agapanthus – friend or foe?

People have love–hate relationships over *Agapanthus* and hold polarising views. In a recent online opinion poll (*Agapanthus: Pest or beautiful bloom?* www.stuff.co.nz), views were nearly equally divided.

On one hand the numerous cultivars are popular and widely available from the garden industry, both locally and internationally, and are exported commercially in large quantities. They are useful garden, container and amenity plants with year-round lush foliage and showy flowers that are also used in the cut flower market. They have fast growth, long flowering periods, hardiness and

low maintenance. Some consider them useful for stabilising slip-prone land. *Agapanthus* has resistance to glyphosate (e.g., Roundup®) so amenity plantings can easily be kept clean of emerging weeds by spraying.

However, on the other hand these are qualities that make *Agapanthus praecox* subsp. *orientalis* a nuisance and a weed. It has serious impacts on native ecosystems, competing with and displacing native plant communities, particularly in coastal areas. As mentioned, it is resistant to some herbicides and there is no biocontrol available. *Agapanthus* rhizomes are extremely difficult to dig out and remove; any left behind

will regrow. The typical tall-growing *Agapanthus* produces abundant seed that germinates readily; this seed can spread by wind and particularly along drains and waterways. Deadheading (removing seed heads before they mature) to reduce seed production is tedious for large plantings and impractical in many areas.

Furthermore, *A. praecox* is among the National Poisons Centre’s top 10 poisonous plants and regularly involved in childhood poisonings (Popay et al., 2010). *Agapanthus* sap causes severe ulceration of the mouth and is also a skin irritant (NPPA TAG Assessments, 2006).

Agapanthus as a weed

Agapanthus praecox subsp. *orientalis* was first recorded as naturalised in New Zealand in 1952 (Neumann, 1952; Healy, 1958; Healy and Edgar, 1980). Neumann (1952, p. 695) commented on “masses of blue agapanthus” growing wild along roadsides at Hokianga.

Healy (1958, p. 532) cited the first herbarium collections of naturalised plants – Allan Herbarium specimens made by Ruth Mason and Neville

Moar in 1953³. Healy (1958) made his own observations of wild plants and in the *Flora of New Zealand* Vol. 3, Healy and Edgar (1980, p. 47–48) gave the localities as “Occasional on coastal cliffs; rare and local on roadsides and in waste land” in Auckland City, Whakatane, near Westport, Lyttelton, near Oamaru, at Port Chalmers and Andersons Bay.

In recent years, there has been increasing concern about the spread and invasiveness of *A. praecox*

subsp. *orientalis*, especially in the Auckland Region (e.g., Popay et al., 2010). In that region, it is a particular problem on the steep coastal cliffs at Piha, Anawhata and Karekare (ARC, 2005); it has also been found on Rangitoto Island, Whangamata Beach (Zimer, 2008), Opito Bay on the Coromandel Peninsula (Fig. 2A–B), and many other places. It produces abundant seed that is dispersed by wind and water and can also spread by vigorous rhizomatous growth

³ CHR 81051, Westport, near Orowaiti Estuary; CHR 88610, Granity, Buller County.

eventually forming a dense and robust monoculture. It now threatens remnant indigenous ecosystems, particularly cliffs, riparian strips, duneland and forest margins of coastal areas.

To address these concerns and after a year's consultation (Thompson, 2006; Williams and Thompson, 2006), the decision was made in 2007 to include the typical large growing form of *A. praecox* subsp. *orientalis* in the Auckland Regional Pest Management Strategy as a Surveillance Pest Plant (ARC, 2007–2012); on 1 July 2008 it was prohibited from sale, propagation, distribution and exhibition (large forms only) in the Auckland Region. In the same year (2008) *A. praecox* was added to the DOC consolidated list of environmental weeds in New Zealand (Howell, 2008).

There have also been recent and contentious submissions to include it as a National Pest Plant

accord (NPPA) species (NPPA TAG Assessments, 2006; Finnigan, 2012).

Cold hardiness

The relatively frost-tender and evergreen species can withstand an average minimum temperature of about -1°C (= Climate Zone 10 in Snoeijer, 2004). These species (e.g., *A. africanus*, if present in New Zealand; *A. praecox*) are more likely to become naturalised in the milder areas of New Zealand, as indeed *A. praecox* subsp. *orientalis* is vigorously naturalising in the wider Auckland region.

Conversely, the cold-tolerant and deciduous species (e.g., *A. campanulatus*, *A. coddii* and *A. inapertus*)⁴, and some cultivars derived from them, may survive much colder temperatures (perhaps as cold as -12 to -17°C ; = Zone 7 in Snoeijer, 2004). These have the potential to establish in inland, southern, mountainous and

cooler regions of New Zealand and potentially pose a previously unrecognised environmental risk.



Fig. 2 Blue- and white-flowered *Agapanthus praecox* subsp. *orientalis* naturalised at Opito Bay on the Coromandel Peninsula. **A**, population. **B**, clumps of white- and blue-flowered plants. Photos: Trevor James.

Dwarf cultivars

Current gardening trends have shifted away from the tall-growing selections of *Agapanthus* and are now favouring the low-growing (so-called 'dwarf') cultivars. These dwarf selections are popular for their tidy and compact growth habit and are better suited to smaller gardens.

Many dwarf cultivars are likely to be selections made from *Agapanthus praecox* subsp. *minimus* or of hybrids with that subspecies.

One of the most popular dwarf cultivars in New Zealand is *Agapanthus* 'Streamline' (Fig. 3A–C). It has a long flowering season and abundant sky-blue flowers.

Agapanthus 'Streamline' was propagated from a previously unnamed plant growing at the Auckland Botanic Gardens. This plant impressed an evaluation panel led by the late George Rainey who gave it its name (Jack Hobbs, pers. comm.). *A.* 'Streamline' has been available since about 1991.

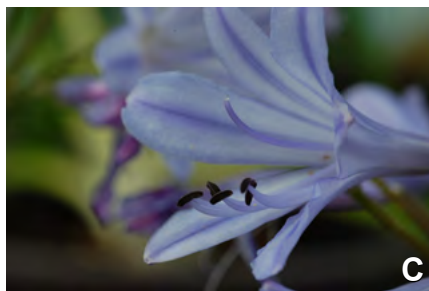


Fig. 3 *Agapanthus* 'Streamline'. **A**, plant in flower. **B**, inflorescence. **C**, close-up of flower. Photos: Kerry Ford.



Fig. 4 *Agapanthus* 'Golden Drop', a new variegated selection. Photo: Ross Bayliss.

⁴ *Agapanthus caulescens* is also cold hardy and deciduous, but probably absent from New Zealand – see Box 1.

Agapanthus 'Golden Drop' (Fig. 4) was selected in about 2008 by Chris Roebuck of Auckland. It arose as a variegated 'sport' (a vegetative division) from *A.* 'Streamline'. It has golden yellow variegation on its leaves and, like its parent, is a dwarf cultivar with abundant sky-blue flowers – probably one of the most free flowering of the variegated dwarf cultivars. *A.* 'Golden Drop' is a new selection soon to be available to the New Zealand public, Europe and the USA (Growell Plants online plant list); New Zealand Plant Variety Rights has been applied for (Chris Roebuck and Ross Bayliss, pers. comm.).

In a response to demands from the public to have *Agapanthus* selections they can still buy and grow, and from local authorities for less invasive alternatives, the New Zealand nursery industry has released a range of dwarf cultivars promoted under various terms, such as 'Auckland safe', 'eco-friendly', 'environment safe', 'low-fertility' and 'sterile'.

Dwarf cultivars claimed to be sterile or of very low fertility include *Agapanthus* 'Baby Pete' (Fig. 5), *A.* 'Pavlova' (Fig. 6), *A.* 'Sarah' (Fig. 7A–C), *A.* 'Finn' (Fig. 8A–C), *A.* 'Finnline', *A.* 'Goldstrike' (Fig. 9), *A.* 'Peter Pan', *A.* 'Tinkerbell' (Fig. 10), *A.* 'Thunderstorm', *A.* 'Double Diamond' and *A.* 'Agapetite' (Fig. 11A–B).

Agapanthus 'Baby Pete' and *A.* 'Pavlova' are dwarf cultivars stated to be 'environment safe'. Both selections are subject to PVR applications and have recently become available in New Zealand (Anon., 2011).

Agapanthus 'Baby Pete' has pale blue flowers (Fig. 5). It was imported from Australia and Lyndale Nurseries are licensed to grow it in New Zealand (Malcolm Woolmore, pers. comm.).

Agapanthus 'Pavlova' has creamy-white flowers and blue-grey leaves and is also available from Lyndale Nurseries (Fig. 6). It was raised sometime prior to 2000 by Terry Hatch (Joy Plants, Pukekohe). *A.* 'Pavlova' arose as a single hybrid plant among a batch of *A. inapertus* seedlings and the pollen parent is probably *A. praecox*. None of the plants propagated and named *A.* 'Pavlova' have appeared to set seed (Terry

Hatch and Malcolm Woolmore, pers. comm.).



Fig. 5 *Agapanthus* 'Baby Pete'. Photo: Lyndale Nurseries.



Fig. 6 *Agapanthus* 'Pavlova'. Photo: Lyndale Nurseries.

Agapanthus 'Sarah' (Fig. 7A–C) is the third dwarf selection in Lyndale Nurseries 'environment safe' range (Anon., 2011). It has distinctly arranged upward-pointing florets producing a candelabra-shaped umbel, bicoloured florets, soft blue flowers and dark green foliage. It was raised in 1993 by the late Mike Geenty in Hamilton, New Zealand, through a controlled breeding programme. The female parent was an unnamed *A. praecox* seedling, "characterised by its strong stem, blue to lilac flower colour and leaf colour atypical for *A. praecox*". The male parent was a proprietary *A. praecox* seedling, "characterised by its profuse florets and leaf colour atypical for *A. praecox*". The flowering progeny was selected in 1996 (United States patent application PP13236, 19 Nov 2002). *A.* 'Sarah' received New Zealand Plant Variety Rights in 2009 (*NZPVR Journal*, No. 117, 14 April 2009).

Agapanthus 'Finn' and *A.* 'Finnline' were both raised by Ian Duncaif and named after his youngest son.



Fig. 7 *Agapanthus* 'Sarah'. **A**, plant in flower. Photo: Lyndale Nurseries. **B**, inflorescence. Photo: Kerry Ford. **C**, close-up of flower. Photo: Kerry Ford.

Agapanthus 'Finnline' is a variegated white-flowered cultivar selected from amongst a batch of an *A. praecox* (non-variegated) tissue-cultured line. The fact that it arose within the micropropagation environment supports the idea (stated earlier) that there is indeed a percentage of instability when propagating *Agapanthus* through tissue culture. Variegation has arisen several times in *Agapanthus*, both within and outside of tissue culture. *A.* 'Finnline' was first offered for sale 15 April 2002. It has a distinctly compact and dwarf growth form and silvery-

grey variegation. It is essentially a foliage plant as *A. 'Finnline'* does not flower freely and the flowers are a little distorted. It is considered sterile by Ian Duncalf (pers. comm.) as he has not observed any seed production. A few nurseries still grow *A. 'Finnline'* but it is slow to propagate in commercial quantities.

Agapanthus 'Finn' (Fig. 8A–C) originated as a 'sport' (a visible asexual mutation) from *A. 'Finnline'* (Ian Duncalf, pers. comm.). *A. 'Finn'* arose outside of tissue culture and is a reversion to non-variegation. *A. 'Finn'* first came on the market 20 September 2005 (Serra Kilduff, pers. comm.) and received New Zealand Plant Variety Rights in 2009 (*NZPVR Journal*, No. 117, 14 April 2009).

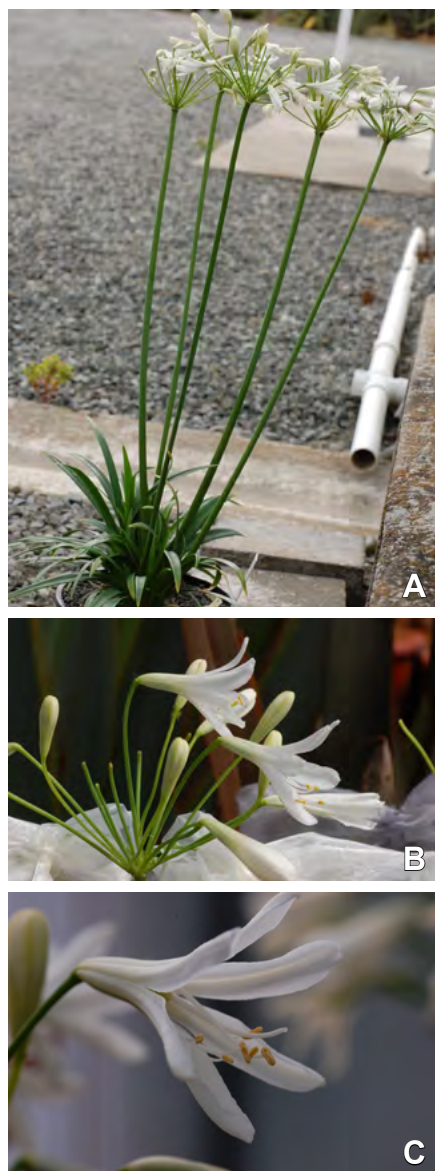


Fig. 8 *Agapanthus 'Finn'*. **A**, plant in flower. **B**, inflorescence. **C**, close-up of flower. Photos: Kerry Ford.



Fig. 9 *Agapanthus 'Goldstrike'*, a variegated cultivar. Photo: Lyndale Nurseries.

Agapanthus 'Goldstrike' (Fig. 9) was raised by Ian Gear in 1990 when he owned Heritage Horticulture nursery in Hamilton (Ian Gear, pers. comm.). It arose as a chance variegated seedling from a batch of seed of a non-variegated plant. *A. 'Goldstrike'* is named after its striking golden-yellow margin on the outside edges of the leaves, contrasting with grey and bluish toned longitudinal stripes. It has a compact growth habit and dark blue flowers on black stems. Like many cultivars its exact parentage is unknown, but (although evergreen) *A. 'Goldstrike'* does have *A. inapertus* in its parentage. According to Ian Gear (pers. comm.) it must be propagated by rhizome division as tissue culture is not successful. Ian Gear and Malcolm Woolmore (pers. comm.) consider *A. 'Goldstrike'* to be sterile or of very low fertility as under the conditions where they have grown the selection it sets almost no seed and the seed that is produced has not germinated for them. *A. 'Goldstrike'* was provisionally called *A. 'Geagold'* (Snoeiijer, 2004) but it was never sold under this name. *A. 'Goldstrike'* is one of the best variegated *Agapanthus* and (along with *A. 'Baby Pete'*, *A. 'Finn'*, *A. 'Pavlova'* and *A. 'Sarah'*) is marketed by Lyndale Nurseries under the KiwiGold® label (www.kiwigoldnz.com).

Earlier purported sterile or low-fertility dwarf *Agapanthus* sold in New Zealand are *A. 'Peter Pan'* and its variegated sport *A. 'Tinkerbell'* (both listed by Gaddum, 1997).

Agapanthus 'Peter Pan' is a selection of *A. praecox* subsp. *minimus* raised by J.N. Giridlian's Oakhurst Gardens, California, USA, in 1949. Snoeiijer (2004) comments that it is still widely cultivated but mainly propagated by seed. This comment appears to contradict some New Zealand nurseries who claim that it is sterile or self-sterile. Because of its long history of cultivation, and the variation induced through seed propagation, it is possible that selected strains have been developed with lower fertility. According to Malcolm Woolmore (pers. comm.), the late Mike Geenty was said to have developed a supposedly 'sterile' strain and it is this that Lyndale Nurseries vegetatively propagate via division of rhizomes. Lyndale Nurseries note that it produces seed when grown in the vicinity of other *Agapanthus* but consider that it is self-sterile (Malcolm Woolmore, pers. comm.)⁵.



Fig. 10 *Agapanthus 'Tinkerbell'*, another cultivar with variegated leaves. Photo: Barrie McKenzie.

The variegated cultivar *Agapanthus 'Tinkerbell'* (Fig. 10) has also been claimed to be sterile or semi-sterile. It was raised in New Zealand by Barrie McKenzie (of the former Topline Nurseries in Oratia) in the late-

⁵ These qualified claims are typical and point to uncertainty of what cultivars are truly sterile.

1970s. It arose as a single variegated seedling from a seed lot imported from California of *A. 'Peter Pan'*. Bryan King of North Shore Nurseries (the wholesale part of Kings Garden Centre, which later became King's Plant Barn) obtained propagation material from Barrie McKenzie and bulked-up and marketed it in the late 1970s or early 1980s (much earlier than 1991 stated by Snoeijer, 2004). It was named *A. 'Tinkerbell'* alluding to its parent *A. 'Peter Pan'* (Barrie McKenzie and Bryan King, pers. comm.). Although it has a reputation as a shy flowerer, there are apparently also plants under that name that are free-flowering.

Agapanthus 'Thunderstorm' is a new selection that has variegated foliage and lilac-blue flowers (Growing Spectrum online Nursery Catalogue, March 2012). This cultivar was raised by Ian Duncalf (pers. comm.) and arose in about 2000 as a variegated sport from a tissue culture batch of *A. 'Gayle's Lilac'*. *A. 'Thunderstorm'* is lower growing than *A. 'Gayle's Lilac'* and is strongly variegated, appearing quite gold in full sun but much more silvery in part shade. The flower has a distinctive protective bud sheath as does the parent. *A. 'Thunderstorm'* flowers later than many of the other dwarf forms. Ian has found *A. 'Thunderstorm'* to have very low fertility and he has not succeeded in outcrossing it. New Zealand Plant Variety Rights will soon be applied for this cultivar (Ian Duncalf, pers. comm.).

Agapanthus 'Double Diamond' is a dwarf selection with white semi-double flowers. These semi-double flowers, usually composed of 8–10 tepals, may be responsible for the stated sterility of this cultivar⁶. It was raised by Jim Holmes of Cape Seed & Bulb, South Africa, and known since 2000 when Plant Variety Rights was applied for (Snoeijer, 2004). *A. 'Double Diamond'* has been commercially available since 2003 and is currently sold in South Africa, the UK, France, Ireland, Israel, and Spain. It was imported into New Zealand for a time but not commercially released (Barrie McKenzie, pers. comm.).

Another dwarf selection with white semi-double flowers is *Agapanthus 'Agapetite'* (Growing Spectrum online Nursery Catalogue, March 2012; Growell Plants online plant list). This is the only double-flowered selection currently available in New Zealand and one of the smallest growing *Agapanthus* (100 mm tall in foliage with 200 mm tall flower stems). *A. 'Agapetite'* (Fig. 11A–B) was raised by Teresa and John van der Elst in Waitara (Ross Bayliss and John van der Elst, pers. comm.). It arose around 1999 as a chance seedling of unknown parentage from a range of smaller growing *Agapanthus* cultivars. When grown on Teresa noticed that it had double flowers and the van der Elsts have never observed it with seed (John van der Elst, pers. comm.). Plant Variety Rights has been applied for in New Zealand (*NZPVR Journal*, No. 126, 14 July 2011) and other countries.

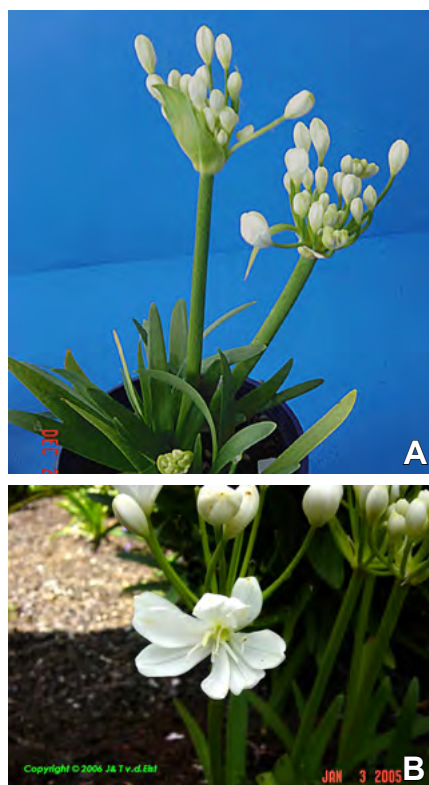


Fig. 11 *Agapanthus 'Agapetite'*. **A**, plant in flower bud showing its diminutive stature. **B**, close-up of semi-double flower showing additional tepals. Photos: John van der Elst.

Agapanthus 'Flore Pleno' is the other double-flowered selection that has been available in New Zealand. Snoeijer (2004) cites 1878 as the earliest date it was recorded (from France).

Agapanthus 'Senna' is not dwarf, but a medium height cultivar, and also claimed to be sterile (Anon., 2012). It has unusual 700–900 mm erect and robust black stems, and dark purple flowers. It was bred in 2004 by Piet Zonneveld (*Agapanthus* Kwekerij, Hillegom, The Netherlands), who self-pollinated the parent, *Agapanthus africanus* 'Back in Black'. *A. 'Senna'* was named after Ayrton Senna da Silva, the late Brazilian racing driver. *A. 'Senna'* is new to the New Zealand market (Anon., 2012), wholesaled by Headford Propagators (Robynne Hayman, pers. comm.) and available from several other nurseries (e.g., Annton, Bruntwood and Classic Patch nurseries). It is claimed to be a selection of *A. africanus* (United States patent application PP19972, 28 April 2009). However, the US patent states that it is deciduous, whereas botanical descriptions of the species *A. africanus* give it as evergreen (e.g., Snoeijer, 2004). Furthermore, Snoeijer (2004) states that true *A. africanus* is difficult to grow and do not match plants under that name in cultivation (Box 1). New Zealand Plant Variety Rights has been applied for *A. 'Senna'* (*NZPVR Journal*, No. 126, 14 July 2011) and it has plant breeder's rights protection in other countries.

Fertility testing

Key questions surrounding the 'eco-friendly' dwarf cultivars are which, if any, are truly of low fertility? And are the dwarf cultivars able to hybridise with typical large-growing *Agapanthus praecox* subsp. *orientalis*? Claims of sterility, and associated terms, are rather anecdotal and had not been substantiated by underpinning research.

In response to concerns over *Agapanthus* in their region, Auckland Regional Council contracted Kerry Ford and Murray Dawson of Landcare Research (Lincoln) to help answer these questions. Over two flowering seasons, we conducted detailed fertility assessments of *Agapanthus*. A technical report on the results was completed (Ford and Dawson, 2010).

We investigated the sterility and low fertility claims made of two dwarf cultivars, *Agapanthus 'Finn'*

⁶ Double flowers are often the result of anthers and other floral parts being converted into additional petals, causing sterility. For example, in heather (*Calluna vulgaris*) the fertile single-flowered species is a banned National Pest Plant Accord plant but its sterile double-flowered cultivars are exempt and allowed to be cultivated and sold in New Zealand.

and A. 'Sarah', and their ability to hybridise with the common tall-growing *Agapanthus*. The fertile dwarf cultivar, A. 'Streamline', was included for comparison.

Several methods were used to determine the levels of both male and female fertility: observations of floral morphology and pollen viability (Fig. 12), artificial crossing experiments (self, sib and outcrosses), observations of pollen tube growth (Fig. 13), seed counts and germination rates, and flow cytometry.

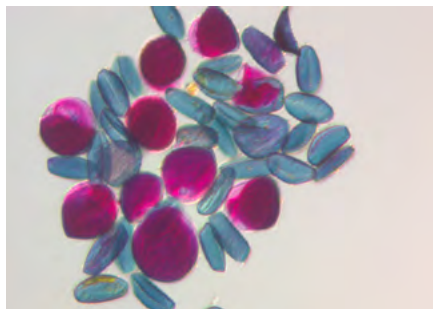


Fig. 12 Low pollen stainability of *Agapanthus* 'Finn'. Empty aborted grains are light blue whereas stained ('viable') pollen is dark red. Photo: Kerry Ford.

Our fertility assessments revealed that none of the plants assessed were fully sterile and all were capable of producing seedlings.

Agapanthus 'Finn' had the lowest overall fertility (it was self-infertile and yielded <10% seed in any outcross involving it; pollen viability was also low at 40%). This may provide a good benchmark for low fertility in *Agapanthus*.

Agapanthus 'Sarah' was self-sterile and had the lowest female fertility (c. 6% seed set) when outcrossed. However, male (pollen) fertility was relatively high.

As expected, the typical tall-growing *Agapanthus praecox* subsp. *orientalis* had the highest fertility across most assessments (54–96% seed set when sib-crossed; >95% pollen viability). When selfed, these wild-type *Agapanthus* accessions had low self-fertility (9.5% seed set). This highlights that self-sterility claims made of some cultivars are rather meaningless; it may not be an unusual condition.

Also as predicted, *Agapanthus* 'Streamline' had high fertility, however, it also had moderate self-fertility with 40% seed set.

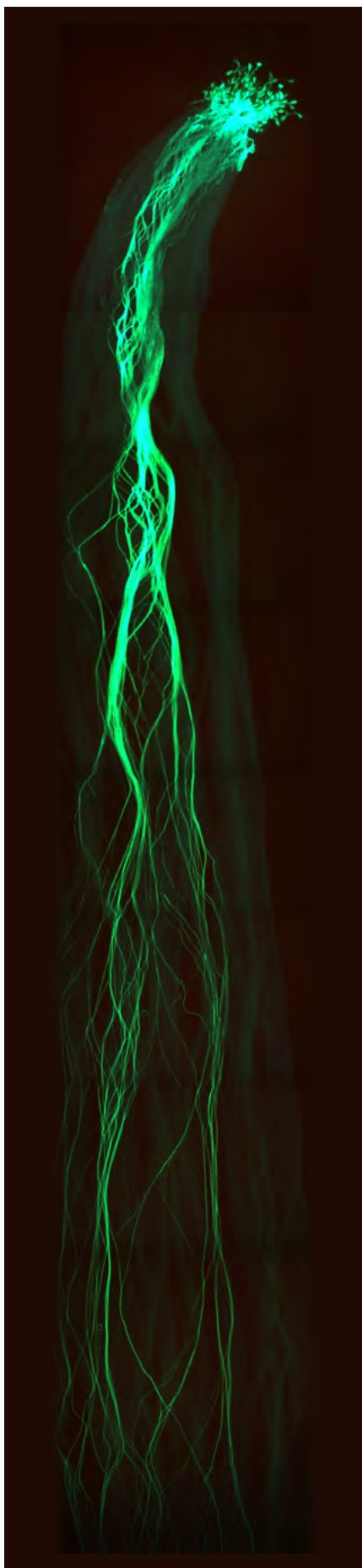


Fig. 13 Abundant pollen tube growth down nearly the full length (c. 30 mm) of the style of *Agapanthus praecox* subsp. *orientalis* as viewed using fluorescent microscopy. Photo: Murray Dawson.

Summary

We have documented the origins of dwarf *Agapanthus* cultivars grown in New Zealand. For completeness, we have included information on other cultivars grown in this country (Appendix 1).

We have also summarised issues of weediness for the tall-growing *Agapanthus praecox* subsp. *orientalis* and questioned 'eco-friendly' and related claims made of some dwarf *Agapanthus* cultivars.

Our fertility assessments (Ford and Dawson, 2010) do show a way forward. Now that we know our techniques work, further fertility testing is needed to objectively evaluate the existing range claimed to be of low fertility.

There is also huge potential for breeding programmes specifically aimed to create fully sterile cultivars – both dwarf and tall-growing selections.

Further fertility assessments and breeding initiatives have the potential to limit future environmental impacts of *Agapanthus* while enabling continued enjoyment of this popular garden plant.

Acknowledgements

This article draws extensively upon information in a Landcare Research technical report (Ford and Dawson, 2010) funded by the former Auckland Regional Council. We thank Auckland Council for permission to adapt this content. A 2012 Envirolink small advice grant, in association with Tasman District Council, was provided to Murray Dawson to make the information more widely available.

We thank the following for providing information on cultivars, photographs and other help: Barrie McKenzie (Plant and Floral Intertrade), Bryan King (Kings Plant Barn), Chris Roebuck (Auckland), Ewen Cameron (Auckland War Memorial Museum), Ian Duncalf (Plant Struck, Tauranga), Ian Gear (In Gear Global), Jack Hobbs (Auckland Regional Botanic Gardens), John van der Elst (Waitara), Malcolm Woolmore (Lyndale Nurseries, Auckland), Richard Ware (Plant Production, Napier), Robynne Hayman (Headford Propagators, Waimate), Ross Bayliss (Growell Plants, North Canterbury), Serra Kilduff (Plant Variety Rights Office, Christchurch), Terry Hatch (Joy Plants) and Trevor James (AgResearch).

Peter Heenan (Landcare Research) and Andrew Maloy commented on the draft of this article.

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- Growell Plants: www.growellplants.com
- Growing Spectrum: www.growingspectrum.co.nz
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- KiwiGold®: www.kiwigoldnz.com
- Lyndale Nurseries: www.lyndale.co.nz
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Box 1 Taxonomy, species and subspecies of *Agapanthus*.

Agapanthus is a genus of herbaceous perennial monocots that are endemic to South Africa (Leighton, 1965). They have been placed in several different families including the Liliaceae, Alliaceae, and in their own family the Agapanthaceae. The latest classification is based on DNA sequencing studies and places *Agapanthus* in the Amaryllidaceae family (APG III, 2009).

The most recent revision of *Agapanthus* is by Snoeijer (2004) who accepted Zonneveld and Duncan's (2003) proposal to recognise six (instead of 10) species equally divided into two sections:

1. Section Lilacinipollini (deciduous, frost-tolerant, leaf usually with a purple base, pollen purple, nrDNA content 22.3–24.0 pg):

A. campanulatus (subsp. *campanulatus* and *patens*)
A. caulescens (subsp. *angustifolius*, *caulescens* and *gracilis*)
A. coddii.

2. Section Ochraceipollini (deciduous or evergreen, frost-tender or tolerant, leaf usually with a green or purple base, pollen yellow, nrDNA content 25.2–31.6 pg):

A. africanus (subsp. *africanus* and *walshii*)
A. inapertus (subsp. *inapertus*, *hollandii*, *intermedius*, *parviflorus* and *pendulus*)
A. praecox (subsp. *minimus*, *orientalis* and *praecox*).

Of these, the following species and subspecies have herbarium vouchers and are likely to be present in New Zealand:

A. campanulatus (and/or *A. campanulatus* subsp. *patens*; AK 228172)
A. coddii (AK 232421)
A. inapertus (AK 221730, AK 228161, AK 291579 and/or *A. inapertus* subsp. *pendulus*)
A. praecox subsp. *orientalis*, *A. praecox* subsp. *minimus* (AK 301534, AK 301535), and possibly *A. praecox* subsp. *praecox* (AK 218779, AK 291578)⁷.

Agapanthus praecox subsp. *orientalis* (including the names *A. orientalis* and *A. praecox*) is by far the most common species in New Zealand.

Although specimens under the name *A. africanus* are vouchered for New Zealand, we are not certain that the bona fide species is present in this country. Snoeijer (2004) states that *A. africanus* is very difficult to grow and almost all selections associated with it are in fact cultivars, hybrids or misidentified *A. praecox*. On the other hand, Snoeijer (2004) may have written this from a European (UK and The Netherlands) cold-climate perspective whereas the two New Zealand herbarium specimens named as *A. africanus* are from warm-temperate regions (AK 149332, locally well-established at a site in Kawerua, near Waipoua State Forest; AK 228173, cultivated at Auckland Botanic Gardens).

The remaining species of *Agapanthus*, *A. caulescens*, appears to be absent from New Zealand.



Fig. 14 *Agapanthus* 'Albus Roseus'. This close-up shows a tinge of pink(-purple) to the flowers with age, although there are no true pink-flowered *Agapanthus* on the market. Photo: M. Harrison (Fiesta Bulbs), via Barrie McKenzie.



Fig. 16 *Agapanthus* 'Blue Skies'. Photo: Barrie McKenzie.



Fig. 18 *Agapanthus* 'Crystal Drop' inflorescence. Some nurseries have claimed the flower colour to be soft pink, but the colour is more realistically described as white with a pale blue tinge. Photo: Barrie McKenzie.



Fig. 20 *Agapanthus* 'Snowball', a white-flowered dwarf cultivar. Photo: Barrie McKenzie.



Fig. 15 *Agapanthus* 'Blue Boy', a cultivar with dense broad foliage and deep blue flowers. Photo: M. Harrison (Fiesta Bulbs), via Barrie McKenzie.



Fig. 17 *Agapanthus campanulatus*, one of the deciduous species. Photo: M. Harrison (Fiesta Bulbs), via Barrie McKenzie.



Fig. 19 *Agapanthus* 'Hazy Days'. Photo: M. Harrison (Fiesta Bulbs), via Barrie McKenzie.



Fig. 21 *Agapanthus* 'Tigerleaf', a variegated green- and yellow-leaved cultivar with blue flowers. Photo: Barrie McKenzie.

⁷ Two subspecies of *Agapanthus praecox*, subsp. *orientalis* and *praecox*, are similar and difficult to distinguish. There are only two New Zealand herbarium specimens tentatively identified as *A. praecox* subsp. *praecox* (both at Auckland War Memorial Museum, AK 218779 and AK 291578). Although this material best fitted descriptions of *A. praecox* subsp. *praecox*, because of the taxonomic difficulties their identifications cannot be assured (Ewen Cameron, pers. comm.).

Appendix 1 – *Agapanthus* species and cultivars recorded from New Zealand

This appendix lists species and cultivars thought to be present in New Zealand⁸ from horticultural resources. The most comprehensive listing for New Zealand is Gaddum, (1997, 1999a, 1999b, 2001); the most authoritative sources are the New Zealand Plant Variety Rights Register and Snoeijer (2004).

Snoeijer's (2004) revision includes details of origin, leaf, flower colour, and his notes and should be consulted for detailed information on each cultivar.

Key to abbreviations for the source of records (websites accessed October 2010 and June 2012):

AD = *Agapanthus* Direct: www.agapanthusdirect.com

BL = Bloomz New Zealand: <http://bloomz.co.nz>

CH = *Commercial Horticulture*, February 2012: p. 44 (Anon., 2012)

DI = Diacks Nursery Catalogue, June 2010: www.diacks.co.nz

GG = Go Gardening: (www.ggm.co.nz) (Anon., 2011)

GP = Growell Plants: www.growellplants.com

GS = Growing Spectrum Full Plant Catalogue, March 2012: www.growingspectrum.co.nz

LYN = Lyndale Nurseries: www.lyndale.co.nz

MR = Mary Robertson *Agapanthus* pages: www.maryrobertson.co.nz/agapanthus.html (page not currently accessible)

PF = New Zealand Plant Finder (Gaddum, 1997, 1999a, 1999b, 2001; website not currently accessible)

PL = Plantlife Propagators: www.plantlife.co.nz

PM = Plantman: www.plantman.co.nz

PP = Plant Production: www.plantproduction.co.nz

PVR = IPONZ – Plant Variety Rights Register: www.iponz.govt.nz/cms/pvr

RED = Redgrove, H. (1991). A New Zealand handbook of bulbs and perennials

VP = Vanplant: www.vanplant.co.nz/agapanthus.htm

WS = Snoeijer, W. (2004). *Agapanthus*: a revision of the genus

Names in bold are the plant names that are accepted in this article.

Agapanthus species/cultivar	Source of record and notes	Comments
A. 'Africans Blue'	PF	
A. 'Agapetite'	GP: Ultra-miniature agapanthus growing to only 10 cm high which features classic pure white double blooms which appear above the foliage all summer and reaching just 20 cm in height. GS: It will stay small and compact and will smoother it self [sic.] in masses of heads of double white flowers. PVR HOM272: Application Date 21/4/2011. Address for service: Growell Ornamental Plants (Bayliss Nurseries Ltd), Rangiora, New Zealand. Breeder: John & Teresa van der Elst, Waitara, New Zealand.	Fig. 11A–B. Recently available, one of the smallest growing <i>Agapanthus</i> and the only (semi-) double-flowered selection in New Zealand. Raised by Teresa and John van der Elst (pers. comm.) of Waitara and thought by them to be sterile or of low fertility.
A. 'Albus Roseus' (Funnel Group)	PF [as A. alboroseus and A. 'Albus Roseus']. PM [as A. 'Alba Rosea']: Evergreen. White flowers. 70–80 cm. Dark, glossy, strap-shaped leaves and beautiful showy flowers. RED: As 'Albus' but flowers show a tinge of pink with age. WS: Introduced in New Zealand, known since 1991, and still in cultivation. Invalid name.	Fig. 14.
A. 'Baby Pete'	GG: 35 cm in height (including flower stems).	Fig. 5. A dwarf cultivar with pale blue flowers, claimed to be sterile or of very low fertility. Recently imported from Australia and new to the New Zealand market (Malcolm Woolmore, pers. comm.).
A. 'Black Pantha' (Funnel Group)	PVR HOM092: Address for service: Omaio Nurseries Ltd, Katikati, NZ. Breeder: G. Morrison, Doncaster, Victoria, Australia. Expiry Date: 28/2/2025. WS: (chance seedling of <i>A. praecox</i> subsp. <i>orientalis</i>), raised by G. Morrison, Doncaster, Victoria, Australia, known since 1999.	
A. 'Blue Baby' (Funnel Group)	BL: Soft blue (dwarf) [flowers]. 0.35–0.5 m. MR [Oct 2010; as A. 'Baby Blue']: This is the smallest and most compact growing of the <i>Agapanthus</i> . A mass of 20 to 30 cm flower spikes carry small balls of true blue. PF [as A. 'Baby Blue' and A. 'Blue Baby']. PL [as A. 'Baby Blue']: Dwarf, blue-flowered form. RED: Probably a cultivar of <i>A. africanus</i> , growing to 60 cm (24 in.), with light blue flowers on rather open heads in summer. WS: From New Zealand, known since 1987, and still in cultivation. Also offered as seed.	Seed propagation may undermine the uniformity of this cultivar. Probably not a cultivar of <i>A. africanus</i> as claimed by Redgrove (1991) as that species may be absent from New Zealand.
A. 'Blue Blazer'	DI [Oct 2010]	

⁸ Excluded from this list are two cultivars (A. 'Ice Maiden' and A. 'Neuseeland') that originated in New Zealand but are not available under those names here. According to Snoeijer (2004) both cultivars were collected as unnamed plants from New Zealand and introduced (and presumably named) in Germany. Also excluded is A. 'Double Diamond', a cultivar imported into New Zealand but never sold (Barrie McKenzie, pers. comm.); A. 'Blue Horizons', grown in New Zealand but currently only sold in Europe (Ross Bayliss and Malcolm Woolmore, pers. comm.); and A. 'Pacific Blue', a sport off A. 'Blue Horizons' that arose in New Zealand but is also currently only available in Europe (Ross Bayliss, pers. comm.).

Agapanthus species/ cultivar	Source of record and notes	Comments
A. 'Blue Boy'	BL [Oct 2010]: Mid blue [flowers]. Massive head. 0.8 m. PF PM: Compact broad foliage with deep blue flowers. 1 m. WS: Offered by Diacks [Nurseries Ltd], New Zealand, known since 1998.	Fig. 15.
A. 'Blue Brush' (Funnel Group)	PF [as A. 'Fragrant Blue']. PVR HOM121: Trade Name: Fragrant Blue. Breeder's Reference: Blue Brush. Address for service: Lifetech Laboratories Ltd, Auckland, NZ. Breeder: V.J. Hooper, Tauranga, NZ. PVR terminated: 31/7/2007. WS: Raised by V.J. Hooper, Tauranga, New Zealand, in 2000; known in the UK since 2001 when offered by Fairhaven Nurseries.	
A. 'Blue Dot'	DI [Oct 2010]: Very hardy blue flowering variety. Ideal for driveways, rockeries. Suits most conditions. Will grow in full wind dry/wet. Grows to 40 cm. PF WS: Known since 1997, New Zealand, and still in cultivation.	
A. 'Blue Ice' (Funnel Group)	PF WS: Raised by Dick Fulcher, Pine Cottage Plants, UK, known since 2001.	
A. 'Blue Isle'	BL [Oct 2010]: Soft blue [flowers], purple rib. 0.8–1.0 m.	Possibly a name in error.
A. 'Blue Mountain'	PF PVR HOM057: Breeder: D. Hughes, Blue Mountain Nurseries, Tapanui, West Otago, NZ. Expiry Date: 30/7/2017. WS: Raised by D. Hughes, Blue Mountain Nurseries, Tapanui, New Zealand, known since 1996.	
A. 'Blue Nile' (Funnel Group)	PF RED: Massive heads of mauve flowers to 1.8 m (6 ft) and broad foliage typical of <i>A. orientalis</i> . WS: (selection of <i>A. praecox subsp. orientalis</i>): Known since 1991, New Zealand, and still in cultivation.	
A. 'Blue Skies'	PF RED: Good full heads of sky-blue flowers to 60 cm (24 in.) from midsummer onwards. WS: Probably from New Zealand. Known since 1991 and still in cultivation.	Fig. 16.
A. 'Bluestorm' (Funnel Group)	WS: New Zealand. Known since 2002 when introduced by Anthony Tesselaar, California, USA.	Low growing selection claimed to have originated in New Zealand by Snoeijer (2004), but stated as having been developed in Australia at www.tesselaar.com/plants/stormagapanthus . If it is sold at all in New Zealand, it is not commonly available here.
A. <i>campanulatus</i> F.M.Leight.	BL [Oct 2010, as <i>A. campanulata</i>]: Soft blue [flowers]. Slender stems. 1.0 m. PF [as <i>A. campanulatus</i> , <i>A. campanulatus</i> 'Deep Purple', <i>A. campanulatus</i> hybrids]. WS	Fig. 17. Often sold as seed in New Zealand so various names are included under the species.
A. <i>coddii</i> F.M.Leight.	PF [as <i>A. coddii</i>]. WS	
A. 'Crystal Drop' (Tubular Group)	MR [Oct 2010; as A. 'Crystal Drops']: A taller grower with 60 cm flower stems. The white flowers have a soft pink blush and are pendulous. PF WS: New Zealand, known since 1996, and still in cultivation.	Fig. 18. Flowers are tinged pale blue (not soft pink as stated by MR). Introduced by the former Topline Nurseries in Oratia (Barrie McKenzie, pers. comm.).
A. 'Dwarf Blue' (Funnel Group)	AD PF WS	Because of seed propagation, the true plant is probably no longer in cultivation – see Snoeijer (2004).
A. 'Dwarf White'	AD BL [Oct 2010]: White [flowers]. 0.35–0.5 m. PF WS	Because of seed propagation, the true plant is probably no longer in cultivation – see Snoeijer (2004).
A. 'Finn'	LYN: (PVR). This dwarf evergreen <i>Agapanthus</i> has neat green foliage topped with attractive pure white flowerheads that bloom for months on end. An Eco Friendly low fertility variety. Half hardy 0.5 × 0.5 m. PL: Sterile med. white, free flowering. PVR applied for. PM: PVR. Neat green foliage. Pure white blooms on green stems. 40–50 cm. PVR HOM231: Breeder: Ian Duncalf, Tauranga, NZ. Expiry Date: 30/3/2029.	Fig. 8A–C. Possibly as A. 'Fin' in Snoeijer (2004).
A. 'Finnline' (Variegated Leaf Group)	PF PVR HOM161: Breeder: Plant Struck Ltd, Tauranga, NZ. Application Withdrawn: 8/7/2004. WS: Raised by Parva Plants, New Zealand, known since 2003.	A variegated cultivar raised by Ian Duncalf (pers. comm.) who considers it to be sterile.

Agapanthus species/ cultivar	Source of record and notes	Comments
A. 'Flore Pleno'	PF [as A. 'Flore Plena' and A. 'Flore Pleno']. RED: A rare and interesting, lower-growing, double-flowered variety of <i>A. orientalis</i> ; methyl-violet. WS: Known since 1878 in France, 1885 in England, and 1888 in The Netherlands.	
A. 'Gael's Sapphire'	PF [Oct 2010].	Uncertain of the validity of this cultivar; was listed in the online version of the New Zealand Plant Finder only.
A. 'Gayle's Lilac' (Funnel Group)	DI [Oct 2010; as A. 'Gayles Lilac']: A very hardy Agapanthus. Will grow in full shade or full sun. Lilac blue flowers in midsummer. Ideal for borders. Grows to 60 cm. PF [as A. 'Gayles Lilac']. WS: Introduced in New Zealand, known since 1997, and still in cultivation. Invalid name.	Named by Ian Duncalf (pers. comm.).
A. 'Getty White' (Funnel Group)	PF WS: Introduced in the USA, known since 1990 in the UK when offered as seed. Still in cultivation.	
A. 'Glen Avon' (Funnel Group)	PF [as A. 'Fragrant Glen' and A. 'Glen Avon']. PVR HOM066: Trade name: Fragrant Glen. Breeder's Reference: Glen Avon. Address for service: Lifetech Laboratories, Albany, Auckland, NZ. Breeder: A.D. Gray, Glen Avon, New Plymouth, NZ. PVR Terminated: 8/3/2007. WS: Raised by A.D. Gray, Glen Avon, New Plymouth, New Zealand, known since 1997, and still in cultivation.	
A. 'Golden Drop' (Variegated Leaf Group)	GP: Spectacular new variegated <i>Agapanthus</i> . Smaller, compact growing form. A sport off the very popular Agapanthus 'Streamline' with abundant sky blue flowers. Most flowers observed on a variegated <i>Agapanthus</i> . Very attractive yellow variegation. PVR HOM283: Application Date: 4/5/2012. Address for service: Growell Ornamental Plants (Bayliss Nurseries Ltd), Rangiora, New Zealand. Breeder: Chris Roebuck, Whenuapai, Auckland, New Zealand.	Fig. 4.
A. 'Goldstrike' (Variegated Leaf Group)	PF [as A. 'Gold Strike']. PVR HOM054 [as A. 'Geagold']: Breeder: I.R. Gear, Pukerua Bay, NZ. Application lapsed: 13/1/1999. PVR HOM250: Breeder's Reference: GEAGold. Address for service: Kiwi Flora, Whenuapai, Auckland, NZ. Breeder: I.R. & S.H. Gear Family Trust, Pukerua Bay, NZ. Expiry Date: 12/3/2030. WS [as A. 'Geagold']: Raised by I.R. Gear, Heritage Horticulture, New Zealand, known since 1995, and still in cultivation.	Fig. 9. A dwarf cultivar with variegated leaves and navy blue flowers. Claimed to be sterile or of very low fertility (Ian Gear and Malcolm Woolmore, pers. comm.). Described (as A. 'Gold Strike') in its USPTO Patent Application (http://patft.uspto.gov).
A. 'Hazy Days'	BL [Oct 2010]: Lavender [flowers]. 1.5 m. PF WS: Known since 1997 when offered by Diacks [Nurseries Ltd], New Zealand, and still in cultivation.	Fig. 19.
A. Headbourne Hybrids	PF WS: A group of plants raised by Lewis Palmer, Winchester, Hantsire, UK.	Many different selections and hybrids are offered under this name – see Snoeijer (2004).
A. 'Hinag' (Variegated Leaf Group)	PVR HOM138: Address for service: A.J. Park, Wellington, NZ. Breeder: R.A. Mendoza, Santa Ana, California, USA. Application Withdrawn: 24/2/2003. WS: Trade name Summer Gold. (Seedling of ' Peter Pan ' pollinated by unknown parent, probably a variegated plant) raised by Ramon Alaniz Mendoza, California, USA, in 1986. Introduced by Hines Horticulture, also of California, and still in cultivation.	
A. 'Ice Queen' (Trumpet Group)	PF WS: Offered by Mill House Nursery, Akaroa, New Zealand, who obtained the plant from Bay Bloom Nurseries, Tauranga, New Zealand, in November 1994.	
A. inapertus Beauverd ex F.M.Leight.	PF WS	
A. inapertus subsp. pendulus (L.Bolus) F.M.Leight.	PF WS	
A. 'Isis' (Salver Group)	PF WS: (probably a selection of A. campanulatus): Raised and introduced by Bloom, Bressingham Gardens, UK. Known since 1968 and still in cultivation. Also offered as seed.	
A. 'Jack's Blue' (Funnel Group)	PF [as A. 'Jackis Blue' and A. 'Jack's Blue']. WS: New Zealand, known since 2001 when offered widely in the UK. [Named after] Jack Blyth, a New Zealand nurseryman.	
A. 'Kingston Blue' (Salver Group)	PF WS: (selection of <i>A. campanulatus</i> subsp. <i>patens</i>): Introduced by Miss Raphael, Kingston Bagpuize, UK. Known since 1990 and still in cultivation. Also offered as seed.	

Agapanthus species/ cultivar	Source of record and notes	Comments
A. 'Lapis'	PVR HOM162: Address for service: Balnagar Grove Nursery, M. & M. McBeath, Cambridge, NZ. Breeder: V. Hooper, New Plymouth, NZ. Expiry Date: 16/6/2025.	
A. 'Lavender Haze'	PF PVR HOM133: Address for service: Lifetech Laboratories, Albany, Auckland, New Zealand. Breeder: R.J. & D.M.L. Wood, New Plymouth, NZ. PVR terminated: 28/4/2007. WS: Raised by R.J. and D.M.L. Wood, New Plymouth, New Zealand, known since 2001.	
A. 'Mid Blue'	PF [sold as seed]. WS: Known since 1997, New Zealand, and still in cultivation. Invalid name.	Seed propagation may undermine the uniformity of this cultivar, if it is distinct at all.
A. 'Milky Blue'	PF [sold as seed]. WS: Known since 1997, New Zealand. Also offered as seed.	Seed propagation may undermine the uniformity of this cultivar.
A. 'Mini Blue'	PF WS: known since 1997, New Zealand. Invalid name.	Possibly = A. 'Blue Baby'?
A. 'Mini White'	PF	Invalid name. Possibly = A. 'Dwarf White' and/or A. 'White Baby'?
A. 'Moonshine'	PF [Oct 2010].	Was listed in the online version of the New Zealand Plant Finder only. Possibly the same cultivar as A. 'Moonbeam' which is not yet available pending a PVR application (Richard Ware, pers. comm.).
A. 'Natalensis'	BL [Oct 2010]: Rich purple [flowers]. Deciduous. 1.0 m. PF [as A. natalensis]. WS: Known since 1997, New Zealand, and still in cultivation. Probably a form of <i>A. campanulatus</i> . Invalid name.	
A. 'Newstead Blue'	PF WS: Known since 1998 when offered by Diacks [Nurseries Ltd], New Zealand, and still in cultivation.	
A. 'Nimbus'	PF	The single record for that cultivar name is in Gaddum (2001), as available from Port Perennials, Dunedin, a nursery that no longer appears to be in business.
A. 'Pavlova'	GG: Compact dwarf white flowering selection that can be planted with a clear environmental conscience. Bred in New Zealand by gifted plantsman Terry Hatch. PVR HOM278: Breeder's Reference: Sterile White. Application Date: 19/12/2011. Address for service: Kiwi Flora, Whenuapai, Auckland, NZ. Breeder: Lindsey [Terry?] Hatch.	Fig. 6. A new dwarf cultivar claimed to be sterile or of very low fertility (Terry Hatch and Malcolm Woolmore, pers. comm.).
A. 'Peter Pan' (Funnel Group)	AD BL: Mid blue. 0.8 m. DI: Dwarf African lily with blue flowers. Ideal for tub and under tree plantings. Excellent contrast for landscaping. Grows to 50 cm. LYN: The true sterile form. Tidy compact foliage topped with attractive sky blue flowers highlighted with dark blue picotee. A versatile, easy care plant that's excellent for mass planting. Half hardy 0.5 × 0.5 m. MR [Oct 2010]: A medium sized compact grower with shorter broad leaves. This variety always has a flower or two throughout the year with the main flowering in early summer. Balls are mid blue in colour. PF PL: Free-flowering dwarf blue. Self sterile flower clusters. PP: A most popular tidy compact clumping <i>Agapanthus</i> bearing clusters of sky blue flowers with the central band of the petals lending itself to a darker shade giving a picotee [sic.] effect. A truly sterile form. 50 cm × 50 cm. RED: Narrow leaves, heads of blue flowers to 50 cm (20 in.). WS: (selection of <i>A. praecox</i> subsp. <i>minimus</i>): Raised by J.N. Giridlian's Oakhurst Gardens, California, USA, in 1949. Still widely cultivated but mainly propagated by seed, which is offered through the world. Despite its being among the most widely grown seed-propagated plants, some nurseries state that the plant is sterile.	Claimed to be sterile by some New Zealand nurseries but Snoeijer (2004) states that it is mainly propagated by seed.
A. 'Pink Pearl'	PF	Probably an erroneous name. The single record is in Gaddum (1999a), as available from Margueritas Agapanthus, Cambridge, a nursery that no longer appears to be in business.
A. 'Platinum Pearl' (Funnel Group)	VP: Snowcloud seedling. Stems 85–90 cm tall. Up to 170 florets per head, 60 on secondary stems. Usually 2, often 3 stems per crown. WS: (chance seedling of 'Snow Cloud'): Raised by Parva Plants, New Zealand, known since 1998.	
A. 'Platinum Pink' (Funnel Group)	VP: Snowcloud seedling. Stems 70–90 cm tall. 90–120 florets per stem. Usually 2 stems per crown. WS: (chance seedling of 'Snow Cloud'): Raised by Parva Plants, New Zealand, known since 1998.	

Agapanthus species/ cultivar	Source of record and notes	Comments
A. praecox subsp. minimus (Lindl.) F.M.Leight.	PF [as <i>A. comptonii</i>]. WS	
A. praecox subsp. orientalis F.M.Leight.	PF [as <i>A. orientalis</i> 'Blue' and A. praecox subsp. orientalis]. PL [as <i>A. ori.</i> Blue]: Tall, blue flowered form. PM [as <i>A. orientalis</i> 'Blue']. WS	The typical blue-flowered <i>A. praecox</i> subsp. <i>orientalis</i> . It is likely that several named cultivars are not distinct from this form.
A. praecox 'Albiflorus'	AD [as <i>A.</i> White Large variety]. PF [as <i>A. orientalis</i> 'White', <i>A. praecox</i> 'Alba', <i>A. praecox</i> subsp. <i>orientalis</i> 'Tall White', <i>A. praecox</i> subsp. <i>orientalis</i> 'White']. PL [as <i>A. ori.</i> White]: Tall, white flowers. PM [as <i>A. orientalis</i> 'Alba']. RED [as <i>A.</i> 'Albus']: A white-flowered form of <i>A. orientalis</i> . WS: Known in cultivation since 1864, England, and still widely grown. As the plant was and still is seed-propagated, it is better to regard this as a group of plants that look similar rather than a proper cultivar.	Various names have been applied to the white-flowered tall-growing form of <i>A. praecox</i> .
A. 'Purple Cloud' (Trumpet Group)	AD BL [Oct 2010]: Deep purple/blue [flowers]. Tall, pendulous flowers. 1.8 m. DI [Oct 2010]: One of the largest growing Agapanthus with semi-pendulous purple/violet flowers. Flowers may grow up to 1.8 m high. Grows to 1.8 m. MR [Oct 2010]: A taller grower with 1.2 m flower stems. The flowers are a rich navy blue and pendulous. PF PL: Tall violet/purp heads. Strong broad foliage. PM: Large growing mophead with broad green foliage. 1.2–1.5 m. RED: A very robust cultivar with tall heads of semi-pendulous, violet-purple flowers to 1.8 m (6 ft). The very strong, broad foliage is tinted purple at the base. WS: (probably a hybrid between A. praecox subsp. orientalis and A. inapertus): Introduced in New Zealand, known since 1991, and still in cultivation. Also offered as seed.	Earliest known stock was from Hugh Redgrove, from which the former Topline Nurseries in Oratia produced plants though tissue culture in the mid-1980s as a result of Japanese market demand (Barrie McKenzie, pers. comm.).
A. 'Purple Splendour'	RED: Very similar to 'Purple Cloud' , with slightly more rounded flower-heads. WS: Known since 1991, New Zealand. Very similar to 'Purple Cloud' .	This cultivar may not be currently available in the New Zealand nursery trade.
A. 'Queen Anne' (Funnel Group)	PF RED: A compact form with mid-blue flower-heads to 60 cm (24 in.). WS: Introduced in New Zealand. Known since 1990 and still in cultivation. Also offered as seed.	
A. 'Regal Beauty'	PF PVR HOM124: Address for service: Lifetech Laboratories Ltd, Auckland, New Zealand. Breeder: R.J. & D.M.L. Wood, New Plymouth, NZ. PVR terminated: 31/7/2007. WS: Raised by R.J. and D.M.L. Wood, New Plymouth, New Zealand.	
A. 'Royal Blue' (Salver Group)	DI [Oct 2010]: Almost electric blue flowers. Always a show winner. Great in pots or borders. Will grow in a wide range of sites. Hardy. Grows to 1 m. WS: (probably a selection of A. capanulatus): Raised by The Crown Estate, Windsor, UK, introduced in 1974, and still in cultivation. Invalid name.	Snoeijs (2004) referred to two cultivars with this name but the other cultivar is 'probably no longer in cultivation'.
A. 'Sarah' (Funnel Group)	GG: has the distinction of being the world's first candelabra type flower. The soft lilac blue of its flowers are highlighted by its upturned flower heads. Bred in Hamilton by the late Mike Geenty, 'Sarah' is a true blue sterile garden friend. LYN: (PVR). This is a dwarf <i>Agapanthus</i> with mid green foliage and soft lilac blue flowers marked with a deeper blue picotee. An Eco Friendly low fertility variety. Great for mass planting. Half hardy 0.4 × 0.4 m. PF PVR HOM227 [was HOM105]: Address for service: Kiwi Flora, Whenuapai, Auckland, NZ. Breeder: M.F. Geenty (deceased). Expiry Date: 26/3/2029. WS: Raised by M.F. Geenty, Hamilton, New Zealand, known since 2000, and still in cultivation.	Fig. 7A–C. Claimed to be sterile or with low fertility. Described in its USPTO Patent Application (http://patft.uspto.gov).
A. 'Sea Coral'	LYN [Oct 2010]: Semi-dwarf, narrow-leafed variety. Topped from midsummer with dainty weeping white flowers that flush coral pink as the flowers age. Originally selected with the cut flower market in mind. Hardy. 0.6 × 0.6 m. PF WS: Introduced in New Zealand, known since 2000 when offered in the UK, and still in cultivation.	Raised at the Auckland Botanic Gardens and part of the Sea Series of <i>Agapanthus</i> cultivars (Jack Hobbs, pers. comm.).

Agapanthus species/ cultivar	Source of record and notes	Comments
A. 'Sea Foam'	AD [as A. 'Seafoam']. BL: Semi dwarf with white flowers and broad leaves. 0.35–0.5 m DI [Oct 2010]: A smaller growing variety with pure white flower heads. Strong broad foliage. Will tolerate most soil types. Hardy. Grows to 1.2 m. PF PL [as A. 'Seafoam']: Large pure white 1.2 m strong broad foliage. PM: A very nice, semi dwarf variety with pure white flowers with broad leaves. 60–70 cm. PP: Evergreen. Another excellent pure white agapanthus with broader green foliage than A. 'Sea Spray' . Flowers from mature clumps reach 90 cm. WS: Raised by the curator of the Botanical Garden, Auckland, New Zealand, introduced in 1998, and still in cultivation.	Raised at the Auckland Botanic Gardens and part of the Sea Series of <i>Agapanthus</i> cultivars (Jack Hobbs, pers. comm.).
A. 'Sea Mist' (Funnel Group)	PF PVR HOM079: Address for service: Newplants New Zealand Ltd, Ranui, Auckland, NZ. Breeder: Auckland Regional Council, Manurewa, Auckland, NZ. PVR terminated: 20/9/2002. WS: Raised by the curator of the Botanical Garden Auckland, New Zealand, introduced in 1998. Still in cultivation.	Raised at the Auckland Botanic Gardens and part of the Sea Series of <i>Agapanthus</i> cultivars (Jack Hobbs, pers. comm.).
A. 'Sea Spray' (Funnel Group)	DI [Oct 2010]: An attractive prolific-flowering variety with large white flower heads in Summer. Drought tolerant. Will grow on most sites. Grows to 1.2 m. PF WS: Raised by the curator of the Botanical Garden, Auckland, New Zealand, introduced in 1998, and still in cultivation.	Raised at the Auckland Botanic Gardens and part of the Sea Series of <i>Agapanthus</i> cultivars (Jack Hobbs, pers. comm.).
A. 'Senna'	CH [as <i>A. africanus</i> Senna]: strong upright 70 cm black stems topped with purple-black blooms. PVR HOM271: Application Date: 11/4/2011. Address for service: Multiflora Laboratories Ltd, Newmarket, Auckland, NZ. Breeder: P.J.H. Zonneveld B.V., The Netherlands.	Claimed to be sterile. May not be a cultivar of <i>A. africanus</i> as stated.
A. 'Silver Baby'	AD [as A. 'Silverbaby']. BL: Dwarf. Silvery white flowers with subtle blue edge. MR [Oct 2010]: A dwarf grower with narrow leaves. The smaller white flowers are flushed pale blue. En masse gives a silvery effect. PF PL: Dwarf free-flowering 'steely silver' selection. PM: A dwarf variety with small white flowers flushed pale blue. 30–40 cm. WS: Known since 2001, New Zealand. Habitus dwarf.	
A. 'Small Dark' (Salver Group)	VP: Blue dwarf × <i>patens</i> . Stem 73 cm, slightly drawn. 45 florets. WS: ('Blue Dwarf' × <i>A. campanulatus</i> subsp. <i>patens</i>): Raised by Parva Plants, New Zealand, known since 1998, and still in cultivation. Invalid name.	One parent is possibly referable to A. 'Dwarf Blue'.
A. 'Snow Cloud' (Funnel Group)	PF [as A. 'Fragrant Snow' and as A. 'Snowcloud']. PVR HOM067: Trade Name: Fragrant Snow. Breeder's Reference: Snow Cloud. Address for service: Lifetech Laboratories, Albany, Auckland, New Zealand. Breeder: V. Hooper, Waitara, Taranaki, NZ. PVR terminated: 26/4/2007. VP [as A. 'Snowcloud']: Flower stems 90 cm, up to 1 m in semi shade, with 3–400 florets, as well as secondary stems with fewer florets all of which are scented. This is a hybrid of <i>A. inapertis</i> [sic. = <i>A. inapertus</i> Beauverd] and was selected to start a breeding line since it flowers very prolificly [sic]. WS: (chance seedling of <i>A. praecox</i> subsp. <i>orientalis</i>): Raised by V. Hooper, Waitara, Taranaki, New Zealand, known since 1997, and still in cultivation.	Parentages stated by VP and Snoeijer (2004) disagree.
A. 'Snowball' (Funnel Group)	BL [as A. 'Snow Ball']: Compact growers. 0.4–0.5 m. White flowers in late spring/summer. MR [Oct 2010]: A compact grower ideally suited to borders. 40 cm stems carry balls of white flowers. PF PL: Dwarf white with tidy habit. PM: A truly spectacular show of white flowers when in bloom that highlights the other colours in plants. 70–80 cm. PP [as A. 'Snow Ball']: An excellent dwarf perennial forming attractive mounds of green with compact levels of snowball white flowers. Flowers to 30–40 cm. RED: A dwarf hybrid with pure white flower-heads 40–50 cm (16–20 in.) tall. WS: Introduced in New Zealand, known since 1991, and still in cultivation.	Fig. 20. Parent stock was obtained from Hugh Redgrove by the former Topline Nurseries in Oratia who propagated it from tissue culture and introduced it on the market in the late 1980s (Barrie McKenzie, pers. comm.).
A. 'Snowdrift'	PF	The single record for this cultivar name is in Gaddum (1999a), as available from the former CH Simpson Nurseries, Nelson.

Agapanthus species/ cultivar	Source of record and notes	Comments
A. 'Snowdrops' (Funnel Group)	PF WS: Introduced in New Zealand. Known there since 1997, 1998 USA. Still in cultivation. Invalid name.	
A. 'Snowstorm' (Funnel Group)	PF PM: Cool white, with an avalanche of blossoms. 80–100 cm. PVR HOM050: Address for service: Plant Struck Ltd, Tauranga, NZ. Breeder: R.W. Rother, Emerald, Victoria, Australia. PVR Terminated: 25/4/2012. WS: (chance seedling of <i>A. praecox</i> subsp. <i>orientalis</i>): Raised by R.W. Rother, Emerald, Australia, known since 1995, and still in cultivation.	
A. 'Stormcloud'	BL [Oct 2010; as A. 'Storm Cloud']: deep purple [flowers]. Tall; small head. 1.8 m. PF WS: Descriptions published under this name in the USA and New Zealand differ markedly from each other, and plants are widely raised from seed.	
A. 'Stormcloud Mini' (Funnel Group)	VP: Inapertis [sic. = <i>A. inapertus</i> Beauverd] F ₂ hybrid. Stems up to 100 cm semi-shade in ground, 65–70 cm potted, slightly drawn. 40–50 florets per stem. 1 stem per crown. WS: (F ₂ hybrid of <i>A. inapertus</i> [?]): Raised by Parva Plants, New Zealand, known since 1998, and still in cultivation.	
A. 'Streamline'	AD BL: Soft blue [flowers]. 0.35–0.5 m. Semi-evergreen perennial, perfect for mass planting. DI [Oct 2010]: A hardy blue-flowering variety. Will grow in full sun or shade. Group plantings for best display. Grows to 80 cm. LYN: Trouble free dwarf selection that never ceases to please. Neat foliage gives rise to sky blue flowers on long stems. Can be used in rockeries, as edging or for mass planting. Half hardy 0.5 × 0.5 m. PF PL: Dwarf/med. very long flowering season. PM: An outstanding free-blooming, dwarf variety. Blue flower clusters appear in summer on long stems. 30–40 cm. PP: The most floriferous [sic.] of all the dwarf <i>Agapanthus</i> . This dwarf evergreen perennial bears clusters of sky blue trumpet-shaped flowers budding in August, flowering through summer and again in autumn. 50 cm. RED: (syn. <i>A. minor</i>) – An outstanding cultivar with mid-blue flowers to 60 cm. The flowers appear continuously through winter to a peak display in late spring/early summer. Foliage is narrow but dense, so it makes an excellent ground cover planted at 60 cm (24 in.) intervals. WS: Introduced by Auckland Botanical Garden, New Zealand, known since 1991. Because of seed propagation, plants differ. In contrast, plants of a clone with small, 'grass-like' leaves, propagated by tissue culture, are now offered.	Fig. 3A–C. Propagated from a previously unnamed plant growing at the Auckland Botanic Gardens (Jack Hobbs, pers. comm.).
A. 'Sybil Martin'	PVR HOM023: Breeder: D.C. Martin, C/o F.H. Bacon, Havelock North, NZ. PVR terminated: 14/8/2003. WS: Raised by D.C. Martin, Havelock North, New Zealand, known since 1991.	
A. 'Tandice'	PVR HOM135: Breeder: Tandarra Nurseries Ltd, Hamilton, NZ. Application Withdrawn: 4/10/2004. WS: Raised by Tandarra Nurseries Ltd, New Zealand, known since 2001.	
A. 'The Giant'	PF WS: Known since 1997, New Zealand, when offered as seed.	
A. 'Thunderstorm' (Variegated Leaf Group)	GS: variegated foliage and sky blue flowers. This is a sterile form so will not set seeds.	A variegated cultivar raised by Ian Duncalf (pers. comm.) who considers it to have very low fertility.
A. 'Tigerleaf' (Variegated Leaf Group)	RED: A form of <i>A. orientalis</i> raised by Hugh Redgrove, with striking foliage, green with broad bands of yellow on each side, and blue flowers. WS: (selection of <i>A. praecox</i> subsp. <i>orientalis</i>) Introduced by Hugh Redgrove, New Zealand. Known since 1991 and still in cultivation.	Fig. 21
A. 'Timaru'	DI [Oct 2010]: An excellent NZ raised variety with large heads up to 20 cm in dia. Individual blooms are deep purple/blue. Grows to 1.2 m. WS: Introduced in New Zealand, known since 2001 when offered in the UK.	

Agapanthus species/ cultivar	Source of record and notes	Comments
A. 'Tinkerbell' (Variegated Leaf Group)	AD LYN: This colourful sterile sport of ' Peter Pan ' is always popular. The showy foliage is neatly banded and edged in white. Great in containers or for highlighting a garden border. Half hardy 0.3 × 0.3 m. PF PL: Variegated green and cream. Occasional blue flower mostly sterile. 50 cm. PM: Showy foliage is neatly banded and edged white. 30–40 cm. RED: A sport of ' Peter Pan '; narrow leaves conspicuously striped with white, heads of blue flowers to 50 cm (20 in.). WS: (sport from ' Peter Pan ') Known since 1991, New Zealand, and still in cultivation. It hardly flowers.	Fig. 10. Claimed to be sterile or semi-sterile. Raised by Barrie McKenzie at the former Topline Nurseries in Oratia in the early 1980s (Barrie McKenzie and Bryan King, pers. comm.).
A. 'True Blue'	PF	
A. 'Variegatus'	RED [as A. 'Variegata']: An older variegated plant that has been slow to increase; grey-green leaves are up to 30 cm (12 in.) long, striped and bordered with white; blue flower-heads grow to 35 cm (14 in.) tall. This is a striking plant for a rock garden or the front of a border.	There are likely to be several selections under the ambiguous names 'Variegata' and 'Variegatus' – see Snoeijer (2004).
A. 'Wavy Navy'	PF WS: Known since 1990 when offered as seed. Still in cultivation, offered both as seed and as plant.	
A. 'White Baby'	PF	Possibly the same as A. 'Dwarf White' and A. 'Mini White'?
A. 'White Christmas' (Funnel Group)	BL [Oct 2010]: Ice white [flowers]. 1.0 m. WS: (probably a selection of <i>A. praecox</i> subsp. <i>orientalis</i>): Introduced from South Africa. Known since 1993 and still in cultivation.	
A. white dwf	PF	Probably = A. 'White Dwarf' which is not a valid cultivar name – see Snoeijer (2004).
A. 'White Ice' (Funnel Group)	MR [Oct 2010]: A medium-sized grower. 1.2 m long, thick stems. The large flowers are pure icy white. PF PM [Oct 2010]. WS: Introduced in New Zealand, known since 1997, and still in cultivation.	Introduced by the former Topline Nurseries in Oratia. It was propagated through tissue culture in the mid-1980s and first sold in the late 1980s (not 1997 as stated by Snoeijer (2004)) (Barrie McKenzie, pers. comm.).

