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Amaryllis belladonna: a potential urban landscape wonder

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Abstract

Amaryllis belladonna is an indigenous bulb endemic to the southwestern Cape of South Africa and one of two members of the Cape genus. It is closely linked to the *Brunsvigia* and *Nerine* bulbous species. This bulb has a hysteranthous nature of showcasing the arrival of white to different shades of pink scented trumpet-shaped flowers in late summer to early autumn. By losing its leaves and going into dormancy in the height of summer, it conserves its resources making it a drought-tolerant summer blooming perennial found in nutrient-poor soils. In the wild the specie is well adapted to the fire-prone fynbos environment only after which it sends out blooms in abundance. In cultivation it requires minimum attention and considered to be an impressive and reliable garden landscape and rocky roadside ornamental. *A. belladonna* has proven to be a popular plant that has become naturalized in Mediterranean climates throughout the world. This review could enhance the use and design of *A. belladonna* in the urban landscape.

Keywords: hysteranthous, fynbos, endemic, bulbous ornamental, Mediterranean

INTRODUCTION

South Africa boasts an abundant array and diversity of over 2700 indigenous bulbous species suitable to different climatic conditions. Countless genera endemic to the country have been popularized both locally and internationally for a variety of ornamental purposes (Manning et al., 2002; Barnhoorn, 2013). Many of these evergreen bulbs are much loved and are familiar plants in many garden landscapes however; the deciduous species are much less cultivated. These deciduous bulbs add an interest of colour and detail to areas for a short time and then go into dormancy; vanishing but surviving underground (Honig, 2014). Changes in temperature and seasonal rainfall are fundamental to a bulbs success in any landscape environment. An understanding of how a bulb reacts in and out of season requires patience. This is necessary to improve the plant and to overcome the problems especially associated with relocation and adaption of the plants between the different hemisphere climatic conditions (Reinten et al., 2011). Some South African plants have not been well researched in all basic aspects, thus remaining questions relating to the propagation, cultivation, natural behaviour and often the landscape use and design are absent. These factors are all required in order to fully understand the plants full marketable potential (Seale, 1985; Manning, 2007; Reinten et al., 2011; Barnhoorn, 2013). The aim of this review paper is to explore the use and design potential of *Amaryllis belladonna* L. (*Amaryllidaceae*) in the urban landscape.

AMARYLLIS BELLADONNA L. DESCRIPTION

Botanical description

A. belladonna is a South African indigenous deciduous true bulb more commonly known as the “Belladonna lily”, “March lily” locally or the “Naked lady”, “Madonna lily” or “Jersey lily” internationally. *A. belladonna* was for over more than two centuries considered the only species. In 1997, a second species, *A. paradisicola*, an equally beautiful specimen

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was discovered in the extreme arid Richtersveld, north of the Cape Floral region (Snijman and Williamson, 1998; Manning et al., 2002). *A. paradisicola* differs from its sister species in that its flowers are smaller, less scented, flower only after autumn rains, does not produce any bulb offsets and the leaves are broadly tongue shaped (Snijman and Williamson, 1998; Barnhoorn, 2013; Duncan, 2016).

Other genera from this family of high horticultural importance and similarities found in Southern Africa include the *Clivia*, *Crinum*, *Cyrtanthus*, *Nerine*, *Brunsvigia* and *Scadoxus* (Adams, 2001; Manning et al., 2002).

This bulb has a hysteranthous nature of showcasing the arrival of white to different shades of pink sweet-scented trumpet-shaped flowers in late summer to early autumn. Typically each bulb has one inflorescence, with each stem producing up to 12 flowers (Johnson and Snijman, 1996; McMaster, 2007; Duncan, 2016). Bees and especially carpenter bees are the main pollinators of these flowers (Adams, 2001; Duncan, 2004). As the bulb begins to set seed, the long strap-like leaves emerge into the winter rainfall months of its active growing season. It is during this time that the bulb builds up its starch reserves to store underground during the harsh, dry summers. During the late-spring to summer season, the leaves die back and photosynthesis shuts down sending the bulb into a state of dormancy (Seale, 1985; Barnhoorn, 2013). It is important to allow the foliage to yellow and die back completely, so that the underground storage organ can re-absorb nutrients from the foliage (Honig, 2014). The flowering prior to the foliage emerging known as hysteranthy is common in Cape bulbs (Johnson and Snijman, 1996; Duncan, 2004; Manning et al., 2002; Duncan, 2016). The plant has a growth height of up to 90 cm with a spread of 60cm (Barnhoorn, 2013; Duncan, 2016).

A. belladonna is often only seen flowering profusely in open areas of its habitat subsequent to summer fynbos fires which have been evident on the slopes of Lion's head, Cape Town on a few occasions (Duncan, 2004, 2016). The evidence is observed by the emergence of a multitude of flower spears of fragrant white and pink blooms transforming the recent blackened remains of the burnt fynbos (Johnson and Snijman, 1996). This phenomenon is said to clear the upper vegetation which has been shading the bulbs below and thus exposing them to higher temperatures and the harsh elements (Manning et al., 2002; Manning, 2007; Peirce, 2011; Barnhoorn, 2013).

Distribution and habitat

The bulb is naturally confined to the Western Cape, from the northern Cederberg to the Cape Peninsula, and east to Nature's Valley (Duncan, 2016).

A. belladonna has proven to be a popular plant that has become naturalised in many Mediterranean climates of winter rainfall and summer droughts throughout the world such as Mexico, California, Australia, Spain, New Zealand and the Channel Island of Jersey (Peirce, 2011; Duncan, 2004; McMaster, 2007; Duncan, 2016).

Position, soil type, fertilization and watering

A. belladonna prefers a full sun location but can tolerate a semi-shaded area however; it reduces the quantity of flowers it produces per bulb (Duncan, 2004, 2016; Barnhoorn, 2013). It grows most suitably in moderately-fertile, light well-drained soils (Barnhoorn, 2013). Feed the bulb sparingly from flowering time in late summer until the onset of dormancy in spring (Barnhoorn, 2013). The plant requires minimal water with its seasonal rain preferably in the winter season. The plant has no need for summer water, however it can tolerate a moderate amount in spring and summer provided the soil is well drained (Seale, 1985; Peirce, 2011; Barnhoorn, 2013). This bulb therefore is considered drought-tolerant and grows in unwanted and low maintenance parts of the landscape (Carter, 2007; Peirce, 2011).

Planting

The bulb should be planted with the neck at or just below the soil level, and exposed to the sun (Seale, 1985; Barnhoorn, 2013). An ideal spacing should be around 10 cm between

bulbs but may be spaced closely together for a mass effect (Barnhoorn, 2013; Duncan, 2016). The plants should not be disturbed as it hinders the flowering for several seasons. The bulb reaches a size of around 75 mm in diameter upon maturity (Barnhoorn, 2013; Duncan, 2016).

Propagation and cultivation

In the natural habitat the large and fleshy white-pink seeds are dispersed by the wind and land close to the parent plant, often germinating immediately (Johnson and Snijman, 1996; Duncan, 2004, 2016). Propagation of the seed sown fresh in late autumn in trays of sand pressed in just below the soil surface germinates within about two weeks. These seeds will however take between three to six years to flower (Barnhoorn, 2013). Offsets may be removed in late summer and planted immediately. Lifting and replanting of the bulbs should occur in early summer (Barnhoorn, 2013; Duncan, 2004). The new bulbs and offsets do not flower within the first few seasons as they require reaching a state of maturity and sufficient establishment within the landscape (Johnson and Snijman 1996; Manning et al., 2002; Duncan, 2016).

For many years there were many heated discussions among botanists surrounding the correct naming of *A. belladonna*, as for decades the name *Amaryllis* had simultaneously been used for other bulbous plants with emphasis on the tropical South American species *Hippeastrum*. The matter was finally concluded in 1987 where the name for the South African bulb was unanimously supported (Duncan, 2004, 2016; Barnhoorn 2013). Unfortunately the vivid, summer-flowering *Hippeastrum* hybrids cultivated in abundance both in South Africa and abroad continue to be sold under the incorrect name and have been entrenched in many plant enthusiasts minds as 'Amaryllis' (Adams, 2001; Bryan, 2002; Duncan, 2004).

A. belladonna has been used in cross-breeding with other species from the same family such as *Brunsvigia*, *Crinum* and *Nerine* to produce different hybrids. This has been successful as it varies the flowering times, colours and shapes of their showcased flowers (Bryan, 2002).

The plants are poisonous to humans and livestock and can cause respiratory paralysis if eaten due to the presence of amaryllid alkaloid compounds. The sap from the poisonous bulbs was used by the Khoisan people at the end of their arrows for hunting purposes (Adams, 2001; Duncan, 2004; Barnhoorn, 2013).

Pests and diseases

The bulb is often destroyed by the lily borer, a black and yellow-striped caterpillar which bores into the stem of the plant, hollowing out the soft, pithy inside until it collapses. The fleshy seeds of the belladonna lily are also eaten. This caterpillar is seemingly immune to the toxic alkaloids found in Amaryllidaceae species and attacks amaryllids all over South Africa (Johnson and Snijman, 1996; Barnhoorn, 2013). The caterpillars can be removed using a full cover spray or by hand (Adams, 2001). The plant is relatively disease free (Barnhoorn, 2013).

A. BELLADONNA L. USE AND DESIGN IN THE URBAN LANDSCAPE

The great variety of blooms, colour, flowering time, plant height and shape makes flowering bulbs a good addition to any landscape and garden (Sunset Magazine, 1968; Barnhoorn, 2013; Cornwell, 2018). Designing with bulbs can be considered planting on mass in parks, estates and roadsides for visual impact yet most people use them in smaller quantities as grouped accents or highlights rather than landscape material (Sunset Magazine, 1968; Barnhoorn, 2013, Cornwell, 2018). *A. belladonna* is an adaptable bulb that can be utilized in a variety of settings within the urban landscape (Table 1, Figure 1). The following design functions utilizing *A. belladonna* are as follows:

Table 1. Planting palettes using *A. belladonna* in combination with other plant species. Source: adapted from Sunset Magazine (1968); Honig (2014); Van Jaarsveld (2010).

Planting palette	Function	Description	Suggested companion plant selection
Structure	Beds and borders	Used to accentuate behind low to medium clipped hedges and different boundary fences, slopes, pathways and roadsides	<i>Buxus macowanii</i> ^a <i>Searsia crenata</i> ^a <i>Plecistachys serpyllifolia</i> ^a <i>Lavender angustifolia</i> ^b <i>Santolina chamaecyparissus</i> ^b
Situation	Pots and planters	Used as a single species or combined with other bulbs, annuals or ground covers in pots or planters on decks, patios, windowsills, balconies and in pots temporarily sunken into the landscape	<i>Eucomis autumnalis</i> ^a <i>Petunia species</i> ^b <i>Lobelia species</i> ^{a,b} <i>Hemerocallis species</i> ^b <i>Crassula spathulata</i> ^a
	Gravel and rock gardens	Used together with other deciduous bulbs and succulents to accentuate the hard landscape intermittently	<i>Aristea capitata</i> ^a <i>Haemanthus coccineus</i> ^a <i>Sedum species</i> ^b <i>Sempervivum species</i> ^b
Colour	Seasonal bulbs	Used to provide different flowering and seasonal interest in the same area	<i>Agapanthus species</i> ^a <i>Chasmanthe aethiopica</i> ^a <i>Chasmanthe floribunda</i> ^a
	Grey colour scheme	Used as a sporadic seasonal burst of pink in amongst a colour scheme with grey plants	<i>Artemesia afra</i> ^a <i>Artemesia albula</i> ^b <i>Senecio leucostachys</i> ^b <i>Cerastium tomentosum</i> ^b <i>Stachys olympica</i> ^b
Texture	Grassy effect	Used together with different grasses creating a natural, meadow-like style and accent to the landscape	<i>Melinis nervigulumis</i> ^a <i>Chlorophytum saundersiae</i> ^a <i>Chlorophytum comosum</i> ^a <i>Cenchrus ciliaris</i> ^a <i>Carex species</i> ^{a,b} <i>Dietes grandiflora</i> ^a <i>Dietes bicolour</i> ^a
The senses	Fragrance	The flowers are used to attract pollinators to the landscape	-
	Cut flower	Used as a suitable cut flower	<i>Agapanthus species</i> ^a <i>Seriphium plumosum</i> ^a <i>Asparagus densiflorus 'Meyersii'</i> ^a

^aIndigenous, ^bExotic.

Beds and borders

Plants are often used to reinforce the structure and circulation of a landscape design, whether formally or informally. The design process is not unlike interior design, creating spaces and furnishing them using different colours and textures (Honig, 2014). Often plants are used visually as navigation cues highlighting different transitional zones and hard landscaping features such as pathways and low brick walls (Sunset Magazine, 1968; Van Jaarsveld, 2010; Peirce, 2011; Honig, 2014). Steep slopes and in some instances roadsides in the landscape are often difficult to mow and maintain. Bulbous plants are effective to use on these areas as it eliminates the problems of constant attention (Peirce, 2011; Cornwell, 2018).

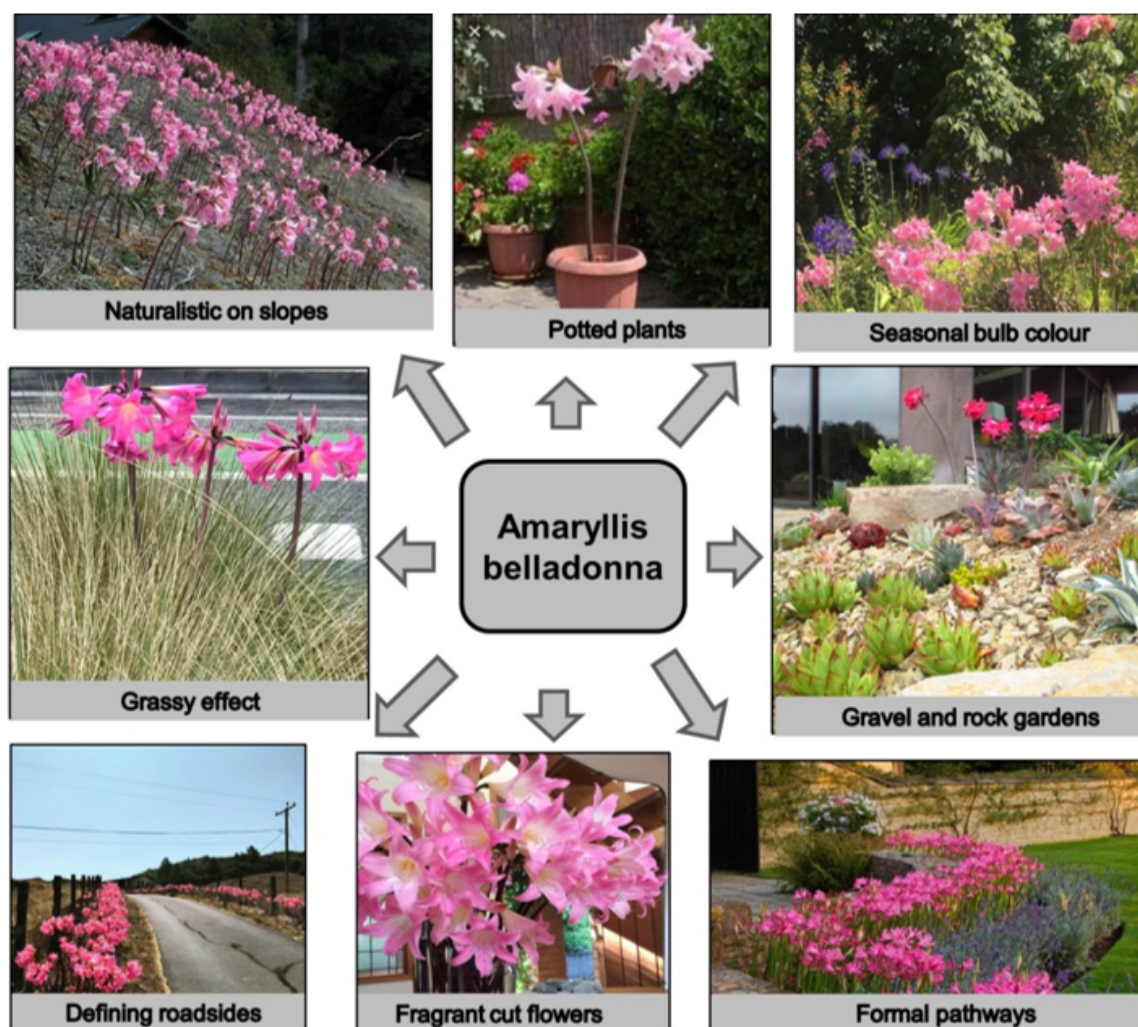


Figure 1. Diagram showcasing the versatility of *A. belladonna*'s use and design in the urban landscape.

A. belladonna together with other plant types have successfully been used and have further potential to be utilized as foreground features against low to medium clipped hedges, along roadsides, slopes, pathways and bed borders as intermittent seasonal features, displaying their short-lived flowering season and lush-green textural foliage (Van Jaarsveld, 2010; Peirce, 2011; Honig, 2014) (Table 1, Figure 1).

Potted plants and planters

A successful method of growing bulbs, especially the deciduous species such as *A. belladonna* is planting them as a single species or grouped with other plants in pots (Table 1) (Figure 1). This can allow the temporal positioning of the sunken pots in different sunny areas within the garden landscape or focal areas as they come into flower, adding seasonal interest and colour (Barnhoorn, 2013; Honig, 2014). Once flowering is completed the portable pots can be moved to a less visible area allowing the foliage to die back to a stage of dormancy, thereafter these pots may be stacked away creating a suitable efficiency of space (Honig, 2014). This method also ensures that the bulb establishment is not disturbed resulting in a delay of flowering over a few seasons (Seale, 1985; Peirce, 2011; Barnhoorn, 2013; Honig, 2014). This can be especially useful in areas where seasonal rainfall may affect the dormancy and flowering of bulbs.

Container gardening has become more popularized on decks, patios, windowsills and

balconies in recent years and often provides concentrated colour in these small areas (Barnhoorn, 2013). Pre-requisites to this style of planting are to ensure a suitable and well-drained planting medium and that the container has adequate drainage holes (Seale, 1985; Barnhoorn, 2013; Honig, 2014). For pots and planters that remain in a desired location, a combination of different seasonal bulbs together with suitable annuals and groundcovers can be utilized to extend the blooming time and seasonal interest.

Gravel and rock garden

Gravel and rock gardens are also a favourable solution to display different seasonal deciduous bulbs in a xeriscape landscaping environment. These hard landscaping areas work well for bulbs which are adapted to nutrient-poor soils, requiring little compost and low watering requirements (Carter, 2007; Honig, 2014). The area can be covered with different sized and colour gravel chip stone. The further use of sculptural rocks as markers or to create features such as a dry river bed can be used to enhance the barren ground (Van Jaarsveld, 2010; Honig, 2014). These stones can double up as informal seating areas. The plants push up through the gravel creating an element of surprise. Once they have finished flowering, set seed and the foliage has died back adequately, the gravelled area can easily be maintained to a neat and tidy state (Van Jaarsveld, 2010; Peirce, 2011; Honig, 2014). *A. belladonna* is a well-suited bulb to use in this type of drought-tolerant design (Table 1, Figure 1).

Seasonal and colour

Growing both evergreen and deciduous bulbs together provide an on-going seasonal interest in the landscape, with their different flowering times and foliage types, which balance one another in different settings (Sunset Magazine, 1968; Manning et al., 2002). An interplanting of blue agapanthus and pink belladonna are a classic combination (Sunset Magazine, 1968; Peirce, 2011). As *A. belladonna* flowers in late summer, early autumn and it often provides colour and interest when other plant species are out of season. The pastel shades of pink *A. belladonna* can be planted to complement an arrangement of grey colour toned herbaceous perennials and ground covers (Sunset Magazine, 1968) (Table 1, Figure 1).

Grassy effect

Grasses were often seen as weeds and animal fodder, but have become popular landscape plants. They provide textural and structural interest, showcasing their often year-round inflorescence in the landscape (Honig, 2014). They work well in informal and naturalistic gardens as well as contemporary landscapes. Local inspiration for landscaping with grasses which are studded with flowering bulbs has become popular (Van Jaarsveld, 2010; Honig, 2014). Naturalistic planting is imitating nature with bulb plantings as bulbs do not grow in rows but appear in irregular scattered clumps all over the landscape. Bulbs naturalise easily in grassy areas (Honig, 2014; Cornwell, 2018). *A. belladonna* integrally adds to the grassy effect during late summer as their long slender stalks arise and sway in the summer breeze and they require very little attention (Dean, 2015) (Figure 1, Table 1).

Fragrance and cut flower

Biodiversity is a sustainable and key component to designing a landscape, with the careful holistic consideration of all elements and role players (Van Jaarsveld, 2010; Honig, 2014). Fragrant plants, whether their foliage or flowers provide an unusual interest to the landscape but are partially crucial in attracting suitable pollinators to the area, for which sexual reproduction would cease to exist (Manning et al., 2002; Van Jaarsveld, 2010; Honig, 2014). *A. belladonna* is a suitable plant to use in a fragrant landscape design and attracts pollinators to the sweet-scented flowers in the garden (Johnson and Snijman, 1996; McMaster, 2007; Duncan, 2016). At the same time, even though flowering time is short-lived, between six to nine weeks, these clusters of flowers make excellent fragrant cut-flowers lasting up to a week in bouquets and arrangements (Adams, 2001; Manning et al., 2002; Dean, 2015) (Table 1, Figure 1).

As mentioned above, it is imperative to recognize and understand the description and myriad of design functions of *A. belladonna* in the urban landscape. Information such as this can potentially examine and promote this plants resourcefulness and develop similar research in other species and their interactive use and design in the urban landscape environment.

CONCLUSIONS

This review has concluded that research should be more focused on the different potential markets of a plant species rather than on preconceived product concepts. Suggestion that this deciduous bulb provides versatility in the landscape, regeneration and hope after the effects often after devastating fires and creating a consciousness of seasonal change marking the end of summer in the urban landscape is clear. *A. belladonna* has huge scope and potential to sporadically transform both its use and design in different urban landscapes both in South Africa and internationally.

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