Plectranthus: A plant for the future?

L.J. Rice, G.J. Brits, C.J. Potgieter, J. Van Staden

Abstract

The genus Plectranthus (Lamiaceae) is a significant, prolific and extensively used genus in southern Africa. It plays a dominant role in both horticulture and traditional medicine. Some 12 species are documented for their use in treating ailments by various indigenous peoples of southern Africa. It is a firm favourite in gardens and Plectranthus has been bred to further utilise the remarkable diversity of indigenous South African wildflowers with amenity horticultural potential. Although previously subjected to both horticultural (Van Jaarsveld, 2006) and ethnobotanical (Lukhoba et al., 2006) review, Plectranthus is a genus with economic potential in various sectors, and this article aims to review this potential of southern African species.

Keywords: Ethnobotany; Flow cytometry; Flowering pot plants; Genetic resources; Plant Breeders’ Rights; Plectranthus; Triploid breeding; Wildflowers

1. Introduction

The genus Plectranthus L’Hér. (Lamiaceae), also known as spurflowers, belongs to the subfamily Nepetoideae, tribe Ocimeae, subtribe Plectranthinae, comprising of ca. 300 species distributed through the tropical and warm regions of the Old World (Retief, 2000) including Africa, India and Australia. The generic boundary is in flux and Paton et al. (2004) showed that the current circumscription is paraphyletic and may require future expansion to include allied genera such as Pycnostachys Hook., Solenostemon Thonn., Aeollanthus Mart. ex K.Spreng., Throncroftia N.E.Br. and Tetradenia Benth.

The diversity of Plectranthus is an important element of the biodiversity of Africa (Bhatt et al., 2010). In southern Africa the genus exhibits its highest level of diversity on the sandstone derived island substrates of southern KwaZulu-Natal (KZN) and the northern parts of the Eastern Cape (EC), i.e. the Pondoland Centre of Endemism sensu Van Wyk and Smith (2001), where 29 described species of Plectranthus occur. Eleven of these species (or sub-species) are endemic or near-endemic to the region. These two provinces (EC and KZN) are home to the species with most promise for horticulture (Van Jaarsveld, 2006). Other prominent areas of diversity are Mpumalanga Province, with 15 species occurring in the area around Barberton, and the KZN Midlands, where 13 species occur near the Karkloof (Potgieter, 2009).

Species of Plectranthus have been grown in hanging baskets in Europe for decades and one such species, Plectranthus oertendahlii T.C.E.Fr. (‘Swedish Ivy’), was named from a cultivated plant in 1924 despite having an unknown wild origin, it has been in cultivation in Sweden for over 100 years. A specimen collected from Oribi Gorge, on the KZN South coast of South Africa, by L. Britten in 1936, remained unidentified until 1974. Material collected from Oribi Gorge by H. Nicholson in 1971/72 was identified in 1973 and finally the mystery was solved (Codd, 1977). It is thought that plants made their way to Scandinavia via the Hermannsburg Mission Society in southern KZN, or via a Swedish surveyor working at Uvongo (Van Jaarsveld, 2006).

Plectranthus is a horticulturally important genus of predominately herbaceous plants that is becoming increasingly popular in indigenous landscaping in South Africa. Some species are suitable as shrubs or may be pruned into hedges; some make good groundcovers; there are good species for rockeries and succulent gardens; and a number of species thrive in large...
containers, pots and hanging baskets. Most species are easily grown from cuttings or seed and require little maintenance other than a need for pruning at the end of the flowering season, making them a welcome addition to any garden.

A continuous demand for novelty has become axiomatic in the field of flower market development. In Europe the cooler climate favours mostly new kinds of potted plants whilst elsewhere new types of both garden and potted subjects are sought. The contribution of South Africa’s spectacular wildflowers to world floriculture spans several centuries and has yielded major new flower crops to world floriculture — e.g. Gerbera L., Gladiolus L., Pelargonium L’Her. ex Aiton. The herbaceous Plectranthus species form a fairly new resource in the continued exploitation of wildflower diversity.

A large number of Plectranthus species are used in traditional medicine in southern Africa, and have potential for development towards their use in the primary health care system (Gaspar-Marques et al., 2006). In fact, Plectranthus is most commonly cited in the literature for its medicinal properties and uses (Lukhoba et al., 2006). Although used for horticulture and other aspects of daily life (Tables 1 and 2), 85% of the documented uses of Plectranthus are medicinal (Table 2) (Lukhoba et al., 2006).

The Lamiaceae are a group of plants which hold valuable biologically active compounds (Dellar et al., 1996) and Plectranthus is no exception. The aromatic nature of the genus is attributed to essential oil production (Alasbahi and Melzig, 2010; Grayer et al., 2010). Isolated diterpenoids exhibit antibacterial (Stavri et al., 2009; Grayer et al., 2010; Simões et al., 2010) and anti-fungal (Simões et al., 2010) activities and may offer resistance to insects (Grayer et al., 2010). In particular abietane diterpenes are responsible for antiplasmodial (Van Zyl et al., 2008), anti-bacterial (Dellar et al., 1996; Gaspar-Marques et al., 2006; Van Zyl et al., 2008), anti-fungal (Dellar et al., 1996) and antitumor (Gaspar-Marques et al., 2006; Van Zyl et al., 2008) activities. The pharmacological activities of these compounds make Plectranthus an important genus to search for drug development (Gaspar-Marques et al., 2006).

Lukhoba et al. (2006) reviewed the genus Plectranthus and its ethnobotanical uses extensively, providing a comprehensive understanding of the global ethnobotany of Plectranthus. Their review touches on the horticultural uses of the genus but, since their review was of an ethnobotanical nature, this subject was not fully explored. Van Jaarsveld (2006) provides a comprehensive horticultural review of South African species providing valuable information on cultivation. Here we offer an updated horticultural and ethnobotanical review of the southern African species. Focusing on the economic potential of Plectranthus and incorporating the history of the genus, its breeding and development.

2. Horticultural use of Plectranthus

Plectranthus is considered the largest genus of Lamiaceae in southern Africa, with ca. 53 southern African species described to date (Codd, 1975, 1985; Van Jaarsveld and Edwards, 1991, 1997; Van Jaarsveld and Hankey, 1997; Edwards et al., 2000; Van Jaarsveld and Van Wyk, 2004; Edwards, 2005; Winter and Van Jaarsveld, 2005). Despite this large number of species, relatively few are popular as ornamental plants in South Africa, but the number of species that are being introduced into gardens is steadily increasing.

Plectranthus is attractive and floriferous and its salient cultural advantages include its low light requirement (shade tolerant), adaptability to semi-dry conditions and tolerance to a warm and dry atmosphere. Furthermore it is robust and easy-to-grow.

Many Plectranthus species are tall plants (1–2 m) with small blue-to-purple flowers (Plectranthus ecklonii, Plectranthus saccatus, Plectranthus zuluensis) and this group is popularly used in landscape gardening (Hitchcock, 1990). Another, smaller, group consists of compact plants, some with decorative leaves and large flowers, which lend themselves to pot plant development (Brits et al., 2001) and also to smaller bedding plants or groundcover use — e.g. Plectranthus hilliardiae, P. oertendahlii, Plectranthus praeternissus, Plectranthus purpuratus, Plectranthus verticillatus.

It is a useful genus for developing new gardens that may need large areas covered in a short space of time as this can be achieved using cuttings. Shrubby and groundcover species assist with a build-up of leaf mulch that fertilises the soil, traps moisture and out competes weeds. Plants produce spectacular autumn displays of flowers, especially when planted en-masse, but a use that is seldom considered is the ability of species of Lamiaceae in general, and Plectranthus in particular, to attract pollinating insects to a garden. A number of solitary bee species, long-proboscid flies, generalist butterflies and day-flying hawkmoths visit Plectranthus flowers for nectar. A pollination study of twenty species of South African Plectranthus and relatives showed that bees (Apidae), and various families of flies (Nemestrinidae, Tabanidae and Acroceridae) are important pollinating agents (Potgieter et al., 1999, 2009) and revealed the existence of a unique guild of long-proboscid fly-pollinated plants that included long-tubed species of Plectranthus (Potgieter and Edwards, 2001, 2005).

The growing popularity of Plectranthus is not limited to its floral diversity but also extends to foliage. A few species show varying degrees of natural leaf patterning (e.g. heritable silver venation of the upper surface of P. oertendahlii leaves, and variegated leaf margins of certain clones of Plectranthus madagascariensis (Pers.) Benth.) whilst others have striking, characteristic, red leaf under-surfaces (e.g. Plectranthus reflexus Van Jaarsv. & T.J.Edwards, P. oertendahlii). This opens a potential for extensive breeding and new cultivars to be developed on the basis of both genetic and vegetative features.

A useful key to identifying South African Plectranthus was published by Hankey (1999) in the popular journal Plantlife. Another useful source of information is the popular PlantZafrica web site of the South African National Biodiversity Institute (www.plantafrica.com) where eleven horticultural entries were made for various Plectranthus species between 2001 and 2010.

Authors of popular general guides on indigenous gardening in South Africa have given some attention to the genus, but mostly recommended the same few species since the 1980s: P. ecklonii Benth., Plectranthus fruticosus L’Her., P. madagascariensis and P. saccatus Benth., with occasional mention made of Plectranthus ambiguus (Bolus) Codd, P. verticillatus (L.f.)

The situation changed when Van Jaarsveld (1987) published a small handbook on Plectranthus that focused solely on this genus and its horticultural potential. He included accounts of eight more species and mentioned another five of interest to gardeners. Van Jaarsveld’s (2000) publication on water-wise gardening listed an additional fourteen species of Plectranthus for use in various bioclimatic zones in southern Africa, although this publication did not give accounts for the species. The most comprehensive treatment thus far is a book published by Van Jaarsveld (2006) which covers all the species in southern Africa. This publication is a culmination of Van Jaarsveld’s interest in Plectranthus since the mid-1970s; he spent most of his career as a horticulturist at Kirstenbosch National Botanical Garden promoting Plectranthus to gardeners and horticulturists.

Van Jaarsveld (2006) gives a full history of the horticultural use of Plectranthus in South Africa. His book covers a number of topics: history of the genus and its discovery, accounts of the searches for plants to cultivate, chapters on the use of Plectranthus in the garden, and full descriptions of 57 species with cultivation notes for each. The cultivation chapters list shade-loving shrubs and perennials, groundcovers for the shade, sun-loving shrubs and perennials, groundcovers for sun/partial shade, recommendations for rock gardens and containers, advice on propagation, pruning, pests and diseases, and a key for identifying the southern African species of Plectranthus.

Of the 57 species covered in Van Jaarsveld (2006), four species do not occur in southern Africa, and five species are considered not very attractive (or are difficult to grow), which presents at least 48 species with horticultural potential. Ten species are recommended as container plants (Van Jaarsveld, 2006), but a further ten of the southern African species are deemed suitable for cultivation in containers. These figures show the enormous potential locked up in the individual species of this genus, before hybridization and selection are considered. Plectranthus has been investigated over the past 30 years, mainly as half-shade garden plants and flowering pot plants (Van Jaarsveld, 1987; Brits et al., 2001).

Internet searches reveal that the popularity of Plectranthus goes far beyond southern Africa. Many searches lead to the use of the popular cultivar, Mona Lavender, but other species are also popular garden plants across the world. The web site for Kamboro Succulent Plant Nursery (http://www.kamboro.com/succulent_plant_nursery/) lists 76 available species and/or subspecies of Plectranthus, of which 54 taxa originate from southern Africa, ten from East/Tropical Africa and beyond, and twelve taxa from Australia.

Caution needs to be applied with international trade since New Zealand has already listed one of the South African species, Plectranthus ciliatus E.Mey. ex Benth., as a ‘Regional Surveillance Plant Pest’ within Auckland (http://www.mznih.org.nz/pages/f0910.2.pdf). Similarly, Plectranthus comosus Sims, with origins in Ethiopia, is listed as a declared Category 3 invader and may not be sold in South Africa (Henderson, 2001). It is also currently listed on the ‘Invasive Species in South Africa’ web site (http://invasives.org.za/flora-listed-invasives/plectranthus-comosus.html). According to Henderson (2001), the name Plectranthus barbatus Andrews was misapplied to this taxon in the past, but at present it appears that the name P. comosus was erroneously applied to P. barbatus in South Africa. Currently, the name P. barbatus var. grandis (L.H. Cramer) Lukhoba & A.J.Paton is considered applicable to the South African taxon (A. Paton, pers. com. 2011), following Lukhoba and Paton (2003) and Lukhoba et al. (2006). The name P. comosus is a synonym of P. barbatus var. barbatus, which does not appear to occur in South Africa (Suddee et al., 2004).

A particularly decorative group of Plectranthus, mostly from the section Plectranthus (subgenus Plectranthus) endemic to forests of the warm eastern coastline of South Africa (Codd, 1985), are annuals and perennials that thrive on semi-dry forest floors and are therefore well tailored to the main requirements of both potted plants for indoor usage (Van Jaarsveld, 1987) and for ‘waterwise’ gardening. The following are good examples: P. praetermissus, P. oertendahlii, Plectranthus lucidus, P. hilliardiae, P. ambiguus and Plectranthus strigosus.

Hybrids form the basis of artificial breeding and horticultural developments in Plectranthus, but natural hybrids are also widespread. Natural areas where more than one species co-occur and share a pollinator often produce extensive stands of hybrids and hybrid swarms. Such hybrids are seldom fertile and multiply through vegetative means. Hybrids share the characteristics of parent species, but may also produce novelties, such as the novel terpenoids recorded by Viljoen et al. (2006) in a natural hybrid of P. zuluensis and P. ciliatus.

3. Floricultural use of Plectranthus

The horticultural potential of Plectranthus continually impressed South African botanical investigators of the genus. Alongside with taxonomic work, living collections were established at botanical gardens and were invariably studied horticulturally as well, albeit on an unofficial basis. The aesthetic appeal of the ‘spurflower’ eventually inspired dedicated floricultural work.

Between the 1970s and the 1990s, Ernst Van Jaarsveld, of the Kirstenbosch National Botanical Garden (now SANBI), complemented the botanical collection of Plectranthus with systematic observations of cultural requirements, with a view to promoting its popular use. Appealing botanical varieties and ecotypes were also established and prominently displayed, and colourful mass plantings of Plectranthus soon became public favourites at Kirstenbosch. Van Jaarsveld maintained the botanical identity of promising ecotypes and subsequently began releasing selected forms of these, often under their botanical variety names (or otherwise under commercially more acceptable popular names) as new horticultural varieties to the gardening industry. Examples are the white and the hooded, dark-striped varieties of P. saccatus (released as ‘King Goodwill’ and ‘Nkanda’, respectively) and P. hilliardiae Codd subsp. australis Van Jaarsv. & A.E.Van Wyk (released as cv. Magwa) (Van Jaarsveld, 1994, 2006).

This foundational horticultural development programme was further supported by publication of horticultural guidelines and
regular promotional articles to the public (e.g. Van Jaarsveld, 1987, 1994), which culminated in the definitive taxonomic revision-cum-horticultural guide The Southern African Plectranthus (Van Jaarsveld, 2006).

Van Jaarsveld also experimented with hybridising, producing the forerunner of the commercial Plectranthus flagship cultivar Mona Lavender (Fig. 4, a cross between P. hilliardiae ‘Magwa’ and P. saccatus, which was subsequently improved by Mr. Roger Jacques (also at Kirstenbosch)).

Involvement with the creation of potted plants from Proteaceae led Brits to recognise a similar potential in Plectranthus. At Kirstenbosch the pot plant qualities of several species had been touted for a long time and attractive species such as P. hilliardiae drew him to this idea.

In 1991 Brits surveyed Plectranthus species and varieties (ecotypes) with favourable characters for pot plant breeding. During a study sabbatical he investigated these in the extensive Plectranthus collection at the Kirstenbosch NBG, Cape Town (described in Van Jaarsveld, 1987). Good candidates were later obtained and grown in 15 cm pots for evaluation as pot plants.

The following Plectranthus types were chosen in accordance with pot and garden plant industry standards, for further work: P. ambiguus, P. hilliardiae, P. reflexus and P. saccatus were selected for their larger flowers; P. ciliatus, P. ecklonii ‘Tommy’, P. saccatus Benth. var. longitubus Codd ‘King Goodwill’ (Van Jaarsveld, 1994) and P. verticillatus were selected for their white flower colour; P. ecklonii ‘Erma’, P. fruticosus and P. verticillatus ‘Pink Surprise’ were selected as pink flower varieties; P. ambiguus, P. ecklonii ‘Medley Wood’, P. hilliardiae, P. praeternissus, P. saccatus and P. zuluensis were the selected blue flower varieties; P. hilliardiae, P. oertendahlii, P. praeternissus and P. verticillatus were selected for their compact growth habit; P. hilliardiae, P. oertendahlii and P. praeternissus were selected for their decorative leaves (Miller and Morgan, 2000); Plectranthus ernstii Codd, Plectranthus neochilus Schltr., P. purpuratus Harv. and P. verticillatus were selected for their tolerance to full sunlight.

The existence of several attractive chance hybrids, both at Kirstenbosch and in private collections, was clear evidence of the hybridization potential amongst Plectranthus species. Varied colours, larger flowers and compact growth habit from different species were combined in new crosses. Hybrids with seed sterility were particularly valued, assuming they would be non-invasive in new habitats.

A number of vigorous, sterile F1 hybrids were selected, tested and later released as flowering pot plant cultivars (c 1999). Plant Breeders’ Rights for these non-invasive plants were obtained in six countries (including the EU zone) under the registered Trademark of ‘Cape Angels®’ (Table 4; Fig. 1). Recently some diploid cultivars (including garden plants and hanging basket varieties) were introduced to China for testing, and further research and development, by the South China Normal University (SCNU) in Guangdong Province (Table 2; Hu et al., 2008).

Species of Plectranthus proved relatively incompatible in crosses (Brits et al., 2001). The segregation and recombination of favourable characters were not easily achieved, on account of infertility in F1 hybrids (Tables 4 and 5).

In order to overcome general sterility in F1 plants, Brits et al. (2001) created allotetraploids of the best crosses. Growing shoot tips of infertile diploid (2n =28) hybrid selections were treated with 0.2% colchicine. Successful tetraploid treatment was investigated using flow cytometry to measure relative nuclear DNA content (Doležel and Bartoš, 2005). Generally fertility was restored in successful allotetraploids and these were crossed to combine and segregate for combinations of good characters, e.g. compact size, large flowers and attractive leaves (Brits and Li, 2008).

Allotetraploids were successfully created in c. 40 infertile F1 diploid (2n =28) hybrids, in 1996, 2002 and 2004 (Fig. 2). The 4n status of some of these was verified (Fig. 5 -2a). The most important group, for flowering pot plants, was (P. hilliardiae x P. saccatus) hybrids (Table 4; Fig. 2). Tetraploids had enlarged leaves and flowers (Fig. 2) and showed restored seed fertility and slight loss of vigour. These plants were judged unsuitable for commercial release on account of their high fertility and consequently the risk of escape and possible invasion in new environments.

Tetraploid and diploid parents were crossed to create 3n plants (3n=42) using reciprocal crosses. The objective was to regain sterility whilst retaining some of the polyploid advantages of large flowers, hybrid vigour, etc. The triploid status of some plants was verified using flow cytometry.

Triploids were, typically, sterile with enlarged plant organs in which hybrid vigour appeared higher (Table 6; Figs. 1, 3 and 4). Triploid status was successfully verified (Fig. 5). For example, triploid Cape Angels® ‘Purple’ [2n P. hilliardiae x 4n (P. hilliardiae x P. saccatus)] — Fig. 3] gave a mean fluorescence (channel no.) of 75, as opposed to 98 for its allotetraploid parent, and this means a basic 3:4 ratio for relative DNA content (Fig. 5-2s, -2a).

Various colours were selected, e.g. rose-white, purple and pink (Figs. 1, 3 and 4). These 3n plants performed well in trials and could be the basis for an improved generation of Plectranthus cultivars compared with the original 2n generation. A new series of these (including some low-fertility tetraploids) are currently under testing in South Africa, Europe and the U.S.A.

The Cape Angels® varieties are being used as ‘model’ plants for the investigation of flower abscission during pot plant transportation (Ascough et al., 2005, 2006, 2008).

4. Ethnobotanical use of Plectranthus

A wide variety of Plectranthus species are used in the traditional medicine of southern Africa. The potential medicinal and economic uses of Plectranthus are of great interest (Gaspar-Marques et al., 2006) as there are potentially treatments for many conditions hidden in this genus. Stems, leaves, roots and tubers of different Plectranthus species are used to treat all thirteen categories of ailments as described in Economic Botany Data Collection Standard (Cook, 1995), with southern African species covering ten categories (Table 2). Other uses include charms (Hutchings et al., 1996), insect repellants (Pooley, 1998) and culinary herbs (Lukhoba et al., 2006). The essential oils
which grant this genus its aromatic nature are thought to hold a number of potential treatments (Rabe and Van Staden, 1998).

*P. ambiguus* is used to treat respiratory ailments (Hulme, 1954). The leaves are crushed and mixed with hot water to make a treatment for colds (Hutchings et al., 1996; Rabe and Van Staden, 1998).

An infusion or syrup made from the aromatic leaves of *Plectranthus amboinicus* (Lour.) Spreng. is prescribed to treat coughs (Rabe and Van Staden, 1998; Albuquerque, 2001). This species is reported to be used in Zulu medicine, the details of which are not described (Hutchings et al., 1996). The leaves may also be used to flavour food (Hutchings et al., 1996; Pooley, 1998; Van Jaarsveld, 2006). In addition, this species is used in the treatment of cattle (Hutchings et al., 1996; Pooley, 1998).

*P. barbatus* does not originate from southern Africa, rather from north-eastern Africa (Codd, 1985), however it is found in South Africa as an invasive species (Van Jaarsveld, 2006). This species is one of the most widely used *Plectranthus* species (Alasbahi and Melzig, 2010). It is mentioned here as it is used to treat all 13 categories of ailments (Lukhoba et al., 2006). The species has low toxicity (Figueiredo et al., 2010) and is the subject of ethnobotanical research (Falé et al., 2009; Figueiredo et al., 2010; Porfírio et al., 2010). It is thought that a tea made from its leaves could be useful in the treatment of dental infections (Figueiredo et al., 2010). Infusions and syrups made from the leaves are used to treat digestive and liver complaints by people of African descent living in South America (Albuquerque, 2001).
Hay fever and headaches are often treated with *P. ecklonii* (Pooley, 1998). The essential oils from this species show both anti-bacterial and anti-fungal activity useful in the treatment of skin infections (Nyanyiwa and Gundidza, 1999).

*Plectranthus elegans* Britten has anti-bacterial, anti-fungal (Dellar et al., 1996) and anti-helmintic activity (Lukhoba et al., 2006), providing this species as a treatment for digestive complaints (Neuwinger, 2000). *P. elegans* is also used for relief from sore throats (Lukhoba et al., 2006).

Perhaps the most familiar species, *Plectranthus esculentus* N.E.Br. or Livingstone potato is grown and stored as a food crop in rural areas of southern Africa. The tubers provide an important source of starch and are highly nutritional (Van Wyk and Gericke, 2000). Tubers are boiled before they are eaten and are said to taste similar to turnips, parsnips (Van Wyk and Gericke, 2000) or sweet potato (Pooley, 1998). This species is very adaptable and so is a desirable food crop for almost any climatic region (Van Wyk and Gericke, 2000). Yield is high and tubers can be dried and stored for winter (Pooley, 1998; Van Wyk and Gericke, 2000). This species is also used to treat digestive complaints and topically to treat skin conditions (Lukhoba et al., 2006).

*Plectranthus fruticosus* has long been noted for its healing properties (Lukhoba et al., 2006). It falls into the ‘skin’ category as it is used in the treatment of burns (Pages et al., 1998). Interestingly, the stems act as a fly repellent (Roberts, 1990; Pooley, 1998), and are rubbed on window sills (Pooley, 1998).

It is not specified what exactly *Plectranthus grallatus* Briq. is used for, but it is reported that the roots are used in Zulu medicine (Hutchings et al., 1996), and that the tubers of this species are traded on the eastern seaboard of South Africa (Von Ahlefeldt et al., 2003).

Infusions from *Plectranthus hadiensis* (Forssk.) Schweinf. ex Spreng. are administered as an enema to treat coughs (Hutchings et al., 1996; Pooley, 1998). Infusions are also used as a charm to ward off evil spirits (Hutchings et al., 1996).

*Plectranthus hereroensis* Engl. has shown both anti-bacterial and anti-viral activity, particularly against *Herpes simplex* (Batista et al., 1995) and activity against certain anti-biotic resistant bacterial strains (Gaspar-Marques et al., 2006). An infusion from the roots is used to treat liver complaints (Ferreira et al., 1997).

Plectranthus laxiflorus* Benth. is used in the treatment of a variety of illnesses. The literature reports its use in nine categories (Table 4). Crushed leaves and stems are used to keep away mosquitoes and also to treat eye complaints (Hutchings et al., 1996). Enemas made from this species are given for fevers and abdominal conditions (Roberts, 1990; Hutchings et al., 1996; Pooley, 1998; Rabe and Van Staden, 1998) and influenza (Watt and Breuer-Brandwijk, 1962). Coughs and colds are treated with a tea (Hutchings et al., 1996; Pooley, 1998; Rabe and Van Staden, 1998), and a mouthwash is made from root infusions and used for loose and bleeding teeth (Hulme, 1954; Hutchings et al., 1996; Pooley, 1998).

*P. laxiflorus* is also used to treat livestock. Roots are crushed and boiled to treat gallsickness. Roots and bark are used in combination against redwater, and crushed and boiled bark is used when the placenta is retained (Masika and Afolayan, 2003).

*P. madagascariensis* is used to treat ailments in the respiratory and skin categories (Lukhoba et al., 2006). Coughs are treated with an enema (Hutchings et al., 1996) or...
alternatively with root decoctions and infusions (Hutchings et al., 1996; Rabe and Van Staden, 1998). Crushed leaves are massaged into the skin to treat scabies (Hutchings et al., 1996).

Although not originally from southern Africa, *Plectranthus rotundifolius* Spreng. is a popular food in South Africa. Native to West Africa, the tubers of this plant (Hausa potato) are eaten as a vegetable and show potential for development as a domestic crop (Rivera Nunez and Obon de Castro, 1992; Venter et al., 2000).

The wide variety of ailments that may be treated with *Plectranthus* is an indication of the medicinal value of the genus. A number of species are not toxic and so may be taken orally, whilst others are used topically on the skin or as enemas. The scope for drug development from these plants is endless and there is undoubtedly a call for further research into this area.

5. Conclusions

*Plectranthus* is attracting growing attention in the horticultural sector, largely due to its marked breeding improvements in recent years. In addition there is a wealth of ethnobotanical species. The potential for research around the horticulture and ethnobotany of the genus imply that this may truly be ‘a plant for the future’.

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### Table 1

Horticultural uses of southern African *Plectranthus* species. Number indicates the conservation status of species.

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<th>Species</th>
<th>Species name with authority and recent synonym</th>
<th>Horticultural use</th>
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<td>Hanging baskets, Potted plant, Rockeries</td>
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<td><em>Plectranthus ambiguus</em></td>
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<td>Rockeries</td>
<td>Pienaar, 1991</td>
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<td><em>Plectranthus amboinicus</em> (Lour.) Spreng.</td>
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<td>Hanging baskets</td>
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<td><em>Plectranthus barbatus</em> Andrews</td>
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<td><em>Plectranthus brevimentum</em> T.J.Edwards</td>
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### Table 2

Ethnobotanical uses of southern African *Plectranthus* species.

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Table 3
Household uses of southern African *Plectranthus* species.

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</table>

Table 4
Cape Angels® flowering pot plants — sterile *Plectranthus (hilliardiae x saccatus)* F1 hybrids.

<table>
<thead>
<tr>
<th>Trade name</th>
<th>Ploidy</th>
<th>Originated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue Angel</td>
<td>2n</td>
<td>1994</td>
</tr>
<tr>
<td>Pink Angel</td>
<td>2n</td>
<td>1999</td>
</tr>
<tr>
<td>White Angel</td>
<td>2n</td>
<td>2002</td>
</tr>
<tr>
<td>Dark Pink Angel</td>
<td>2n</td>
<td>2002</td>
</tr>
<tr>
<td>Purple Angel</td>
<td>3n</td>
<td>1999</td>
</tr>
</tbody>
</table>

(Brits and Li, 2008).
Table 5
Cape Angels® *Plectranthus* evaluated by SCNU as pot and garden plants.

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Hybrid type</th>
<th>Fertility (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amanda</td>
<td>x <em>P. purpuratus</em></td>
<td>0</td>
</tr>
<tr>
<td>Cloud Nine</td>
<td>x <em>P. hilliardiae</em></td>
<td>0</td>
</tr>
<tr>
<td>Coral Cloud</td>
<td>x <em>P. fruticosus</em></td>
<td>0</td>
</tr>
<tr>
<td>Edelbhai</td>
<td>x <em>P. hilliardiae</em></td>
<td>0</td>
</tr>
<tr>
<td>Frills</td>
<td>x <em>P. fruticosus</em></td>
<td>2</td>
</tr>
<tr>
<td>Gurus Choice</td>
<td>x <em>P. saccatus</em></td>
<td>?</td>
</tr>
<tr>
<td>Lilac Spur</td>
<td>x <em>P. oertendahlii</em></td>
<td>3</td>
</tr>
</tbody>
</table>

(Brits and Li, 2008).

Table 6
Flower characters in triploids vs. typical diploid *Plectranthus*.

<table>
<thead>
<tr>
<th>Cultivar (and ploidy)</th>
<th>Corolla (mm)</th>
<th>Flower dry wt (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tube length</td>
<td>Tube width</td>
</tr>
<tr>
<td>(3n) ‘7s’</td>
<td>24.7±0.1</td>
<td>9.0±0.1</td>
</tr>
<tr>
<td>(3n) ‘21a’</td>
<td>30.8±0.2</td>
<td>7.9±0.2</td>
</tr>
<tr>
<td>(2n) Cape Angel® White</td>
<td>20.2±0.1</td>
<td>5.6±0.2</td>
</tr>
</tbody>
</table>

(Brits and Li, 2008).

References


(Alasbahi and Melzig, 2010).