

SAPIA NEWS

SOUTHERN AFRICAN PLANT INVADERS ATLAS

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Excellence in Research and Development

WORKING FOR WATER

Inside this issue:

Editor and SAPIA co-ordinator:
Lesley Henderson
ARC-PPRI, Weeds Research Programme
c/o SANBI
Private Bag X101
Pretoria
0001
South Africa

e-mail: L.Henderson@sanbi.org.za
Tel: 012 843 5035

Articles and photos by Lesley Henderson unless otherwise acknowledged

Invasive berry-producing Solanaceae

This issue of SAPIA News deals with invasive, berry-producing members of the Solanaceae (tomato or potato family) in South Africa. Most of these plants have berries that are poisonous to mammals but not to some birds which disperse the seeds far and wide. Many species have been used as ornamentals and have no other useful purpose. They invade a wide variety of habitats and vegetation types, ranging from agricultural lands, urban open spaces, riverbanks and plantations to forests, savanna and grasslands.

Eight of the twelve currently declared Solanaceae species under the Conservation of Agricultural Resources Act (CARA) are berry-producing: four *Cestrum* species and four *Solanum* species. A further two *Solanum* and one *Nicandra* species have been proposed for listing.

This group of invaders includes species that cause major problems and losses in the forestry and agricultural industries and are a threat to the natural biodiversity in South Africa.

Jerusalem cherry (*Solanum pseudocapsicum*), a favourite ornamental that is becoming a pest in parts of South Africa, especially in cool, moist, shaded habitats. This species has been proposed as a category 1 declared plant, implying that it should be controlled and wherever possible, eradicated. It should not be sold or cultivated. The berries look like edible cherry tomatoes but are toxic.

The **Weeds and Invasive Plants website: www.agis.agric.za/wip** is currently not being managed due to ongoing operational problems at AGIS. However, **fact sheets with information and photos of more than 300 species are accessible.**

Requests for information from the SAPIA database and submission of records of invasive plants should be sent directly to Lesley Henderson at L.Henderson@sanbi.org.za.

SAPIA newsletters are posted at the ARC website: www.arc.agric.za
under 'News Articles'.

Declared weeds: *Cestrum* species (inkberries, jessamines)

Cestrum is a predominantly tropical American genus of 175 to 250 species extending from the southern United States and the Bahamas southwards to Chile and northern Argentina. They are small trees or shrubs with leaves usually alternate, simple and entire; the flowers are tubular or funnel-shaped; fruits are fleshy berries, often black (hence the name 'inkberry') and flowers often fragranced (hence the name 'jessamine'). Many species and hybrids are cultivated as ornamentals.

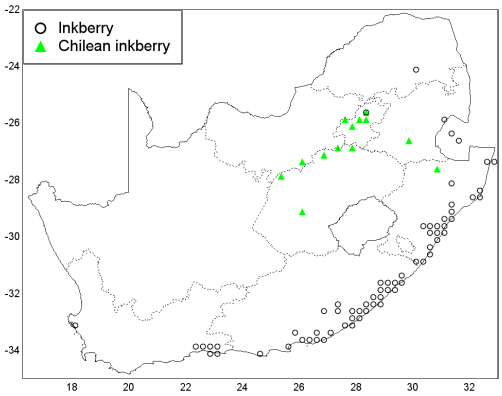
Currently the following species are category 1 declared weeds under CARA, and should be eradicated wherever possible: **orange cestrum,** *C. aurantiacum*, (**fig 1**), with orange-yellow flowers and white mature berries; **crimson cestrum,** *C. elegans,* (**fig 2**), with reddish-purple or pink flowers and red berries; **inkberry,** *C. laevigatum* (**fig 3a & b**), with greenish-yellow flowers in axillary clusters, broad leaves, and black mature berries; **Chilean cestrum,** *C. parqui,* (**fig 4a, b & c**), with greenish-yellow or brownish flowers in axillary and terminal clusters, narrow, elongated leaves and black mature berries. All *Cestrum* species have been proposed as category 1 plants under the revised CARA and National Environmental Management: Biodiversity Act (NEMBA).

All parts of *Cestrum* species are toxic to mammals. Inkberry and Chilean inkberry are extremely toxic to cattle, especially during the winter months of June and July, and early spring. If large quantities of inkberry are eaten the animal usually dies suddenly; less acute poisoning is accompanied by salivation, watering of the eyes, unsteady gait, accelerated breathing, weak pulse and increasing debility. This condition is sometimes known as "Chase valley Disease" after an area near Pietermaritzburg where this poisoning was prevalent. Orange cestrum is often the cause of poisoning in Zimbabwe and East Africa. (Vahrmeijer, J. 1981. Poisonous plants of South Africa). Night-blooming cestrum, *C. nocturnum*, can cause respiratory problems from the scent and feverish symptoms following ingestion.

Inkberry, *C. laevigatum*, is the most widespread and abundant *Cestrum* species in South Africa (see map) occurring mainly in the moist eastern coastal belt where it grows at the margins of bush clumps and forest and in the under-storey of forests and plantations. Chilean inkberry, *C. parqui*, is similar but most easily distinguished by its much narrower leaves. It is better adapted to the cold highveld where it has been known along the Vaal River for many years although misidentified as inkberry.

Beware of Chilean inkberry!

Toxic to cattle, sheep, goats, horses, pigs, poultry (leaves) and humans. This toxic species is becoming increasingly invasive in Gauteng. Municipalities and residents are urged to eradicate these plants. The plants sucker vigorously from the roots and root fragments. Mechanical control will require repeated cutting. Chemical control options would be better; however herbicides have been registered only for inkberry in South Africa




1


2


3a


3b

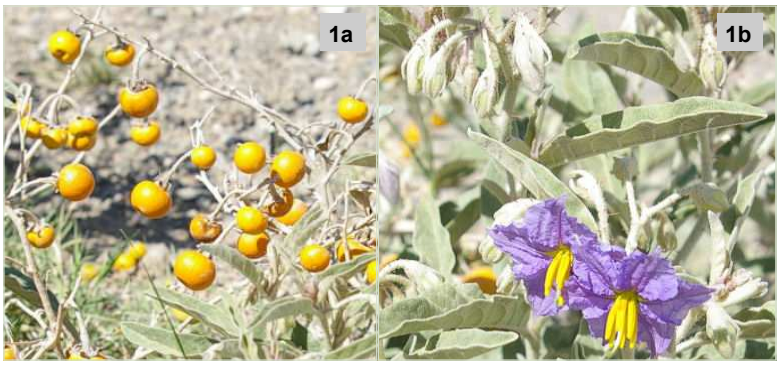

4a


4b


4c

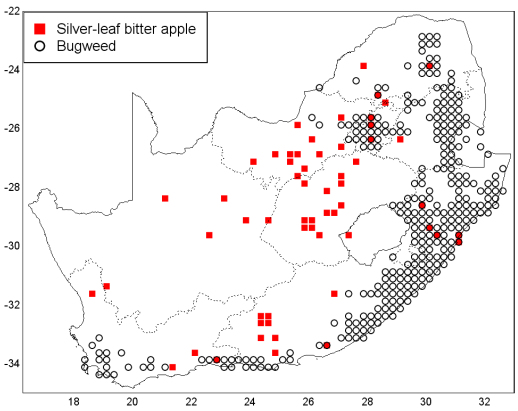
Declared weeds: *Solanum* species (bitter apples, nightshades)

The genus *Solanum* is a large and diverse genus of annual and perennial plants, herbs, shrubs, climbers and trees. About 1250 species are recognised worldwide. Plants are usually hairy, often prickly; leaves usually alternate; flowers usually blue, purple or violet, sometimes white, usually 5-lobed; fruits are usually succulent, globose berries. The genus is a source of numerous toxic and medicinal species, food plants and weeds of disturbed habitats. Most parts of the plants, especially the green parts and unripe fruits, are poisonous, however, many species have edible parts such as fruits, leaves and tubers. Tomato, potato and eggplant are major food crops.

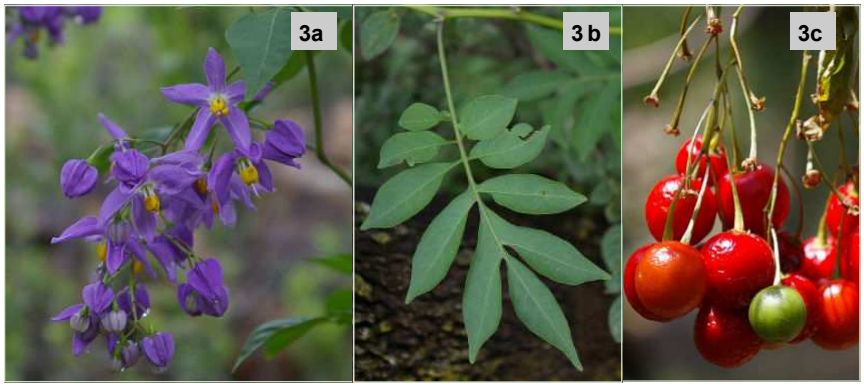


Silver-leaf bitter apple / silver-leaf nightshade / satansbos, *Solanum elaeagnifolium*), (**fig 1a & b**), is a herbaceous, thorny or thornless shrublet 30–60 cm high, with annual stems and deep, perennial, spreading roots; stems and under-surfaces of leaves are covered with white or silvery, felt-like hairs. Leaves are often wavy and folded upwards along their midribs. It is a major agricultural weed with the largest infestations in the Karoo and it is almost impossible to eradicate due to its persistent root system. Chemical control is made difficult due to a small leaf surface area for herbicide absorption but a large root system to kill. The herbicide Tomahawk 200 EC (fluroxypyr 200 g/l EC) is registered for use against this weed. Two leaf-feeding beetles have been released to help control it biologically. All parts of the plant, especially the berries are toxic.

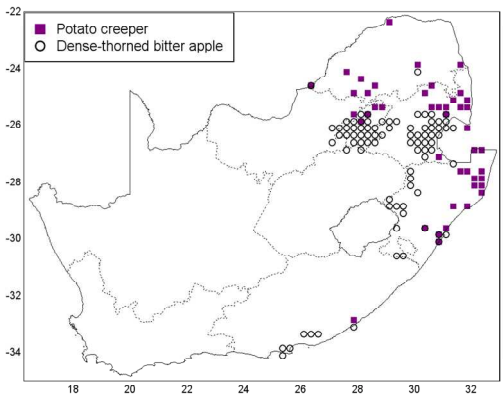
Bugweed, *Solanum mauritianum*, (**fig 2**) is a thornless shrub or small tree usually 2 to 4 m high; all parts except older stems are covered with whitish-felty hairs; leaves emit a strong smell when bruised; berries are 10 mm across, green turning yellow, in compact terminal clusters. It is a major weed of plantations and forest margins. The unripe berries are toxic and the hairy stems and leaves cause irritation to the respiratory tract and skin. Plants can be uprooted or ring-barked; chemical control is recommended for large stands. Two insects: a sap-sucking lace bug, and a flowerbud-feeding weevil have been released to help control bugweed biologically but have yet to be effective.



Potato creeper or Brazilian nightshade, *Solanum seaforthianum*, (**fig 3a , b & c**) is a slender, herbaceous or softly woody climber 2 to 3 m high, without hairs or thorns. Leaves are deeply lobed into leaflets. Flowers are in drooping clusters and berries are shiny, green turning red, in pendulous bunches. It invades woodland, bush clumps and riverine forest. There are no herbicides registered for chemical control. Seedlings should be uprooted before they send down a deep and strong taproot. The whole plant is toxic.



Dense-thorned bitter apple or wild tomato, *Solanum sisymbriifolium*, (**fig 4a & b**) is a very spiny shrub 0.5 to 1.5 m high, with an extensive root system; all parts are covered with sticky, glandular hairs and bright orange-red to brownish-yellow spines. It invades disturbed sites, agricultural lands and plantations. The unripe fruit is toxic. A herbicide has been registered for chemical control. A leaf-feeding tortoise beetle has been released to help with biological control.



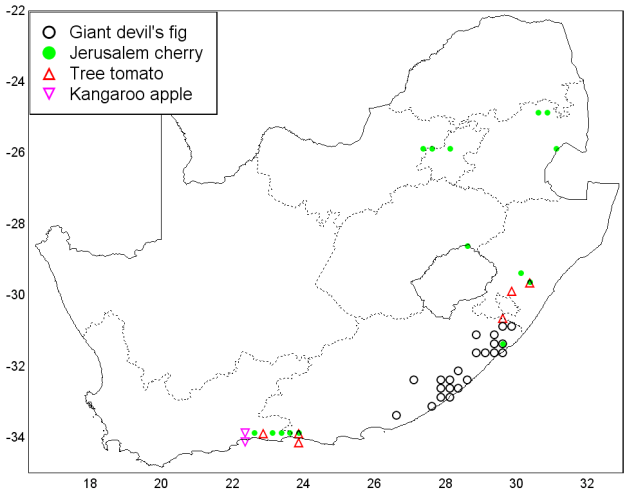
Proposed declared weeds and emerging species

Newly proposed category 1 weeds under CARA and NEMBA:

Apple-of-Peru, *Nicandra physalodes*, **(fig 1),** is an annual herb up to 1.5 m high, mostly hairless, thornless, with bright green leaves that are irregularly lobed or toothed; flowers are blue or pale violet with a white throat, solitary; fruits are dry berries, yellow or brown when ripe, enclosed within a 5-sided, inflated, bladder-like calyx. It invades disturbed sites, plantations and riverbanks, widespread in the eastern parts of South Africa. The berries are toxic.

Giant devil's fig, *Solanum chrysotrichum*, (**fig 2a & b**), is a shrub or small tree to 3 m high, with scattered prickles on stems, leaves and petioles; differs from other *Solanum* species by its coarse reddish-brown hairs on stems, undersurface of leaves and calyx; leaf margin is wavy, to deeply lobed. Flowers are white and ripe berries orange-yellow. Largely confined to the former Transkei of the Eastern Cape where it has been used as a hedge plant. Invades grassland, savanna, forest margins, plantations, riverbanks and disturbed sites.

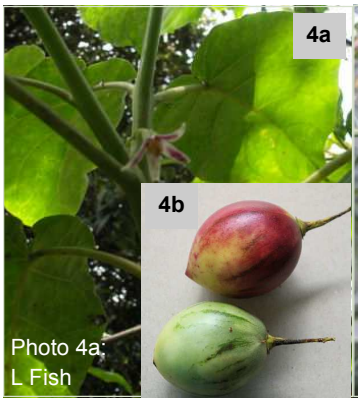
Jerusalem cherry, *Solanum pseudocapsicum*, (**fig 3 and page 1**), is a herbaceous shrublet up to 1.2 m high, thornless, almost hairless, with dark green, slightly wavy-edged leaves; flowers are white, star-shaped; fruit is a succulent berry, green turning orange and bright red. Cultivated as an ornamental. Berries are toxic to humans, domestic pets and some birds—although dispersed by some birds in the wild, most popular pet birds, such as parrots, are susceptible to their poison.



Emerging invasive species:

Tree tomato, *Solanum betaceum*, (**fig 4a & b**), a small tree that produces edible fruit, but is invading forested areas in KZN and the Tsitsikamma region of the southern Cape*;* and **Kangaroo apple***, Solanum laciniatum, (***fig 5a, b & c**), a softly woody shrub up to 3 m high; leaves lance-shaped, entire or lobed; flowers purple-blue, corolla lobes notched; fruits orange-yellow berries ~ 20 mm across. Cultivated as an ornamental, invading wetland habitats in the George area of the southern Cape.

Can you add more localities (outside of cultivation) for any of the species described on this page? Please send locality, GPS if possible, habitat, approximate abundance of the plants, to: Lesley Henderson at L.Henderson@sanbi.org.za



ARC-PPRI, WEEDS RESEARCH PROGRAMME

ARC-Plant Protection Research Institute

Weeds Research Programme
Private Bag X134
Queenswood
0121
South Africa

Phone: +27 (0)12 356 9840
Fax: +27 (0)12 356 9852

Contact: Acting Programme Manager:
Dr Roger Price
e-mail: PriceR@arc.agric.za

General enquiries: Mrs Hildegard Klein
e-mail: KleinH@arc.agric.za

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The Weeds Research Programme of the ARC-Plant Protection Research Institute is responsible for research on the ecology and control of invasive alien plants in South Africa. These plants were introduced either intentionally (e.g. for ornamental use or agroforestry purposes), or accidentally (e.g. in livestock feed) and now threaten biodiversity and agriculture. In addition, they reduce run-off from water catchments, thus diminishing flow in streams, and adversely affect the quality of life of communities.

- Biological control
- Chemical control
- Bioherbicides
- Integrated control
- Monitoring the emergence and spread of invasive alien plants

We are on the Web:

www.arc.agric.za

see Plant Protection News

for current news from the Weeds Research Programme

Read *Plant Protection News* No. 88 for the following news from the Weeds Research Programme:

- Research towards enhancing the biological control of invasive cactus (*Cylindropuntia fulgida*) in Northern Cape
- The current status of yellow bells (*Tecoma stans*), an invasive ornamental plant in South Africa
- Beware of invasive and toxic *Cestrum* species (inkberries, jessamines)

Biological control of invasive plants

Silver-leaf bitter apple/satansbos (*Solanum elaeagnifolium*) and the **leaf-feeding beetle (*Leptinotarsa texana*)**. Photos: L Henderson and Les Oates

Biological weed control is the use of natural enemies to reduce the vigour or reproductive potential of an invasive alien plant. The principle is that plants often become invasive when they are introduced to a new region without any of their natural enemies. The alien plants therefore gain a competitive advantage over the indigenous vegetation, because all indigenous plants have their own natural enemies that feed on them or cause them to develop diseases. Biological control is an attempt to introduce the alien plant's natural enemies to its new habitat, with the assumption that these natural enemies will remove the plant's competitive advantage until its vigour is reduced to a level comparable to that of the natural vegetation. Natural enemies that are used for biological control are called biocontrol agents.

The potential risk posed by a candidate biocontrol agent is determined by biocontrol researchers through extensive host range studies (specificity tests) that are carried out in a quarantine facility. These trials determine the range of plants that a potential biocontrol agent is able to use as host plants throughout its life cycle, as well as its host plant preferences. Permission to release a biocontrol agent will be sought only if the host-specificity tests prove without doubt that the potential agent is sufficiently host-specific for release in this country. To be regarded as sufficiently host-specific, the candidate agent must be either monophagous (i.e. the insect feeds on only one plant species, the target weed in this case) or it could have a slightly wider host range, provided that none of the additional host plants occur in South Africa or surrounding countries, either as indigenous or introduced crop plants.

South Africa is regarded as one of the world leaders in the field of biological control of invasive alien plants. Since the 1930s we have brought 29 invasive alien plant species under complete or substantial biological control. In the process, 111 species or biotypes of natural enemies were released, 85 of which became established. Remarkable successes have been achieved with either controlling or reducing the invasive potential of many invasive plants including cacti, aquatic weeds, Australian wattles, chromolaena and lantana. Seed feeders feature strongly in many of our projects. Tested and safe biocontrol agents are distributed in cooperation with the *Working for Water* Programme of the Department of Water Affairs.