SAPIA NEWS

SOUTHERN AFRICAN PLANT INVADERS ATLAS

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Excellence in Research and Development

WORKING FOR WATER

environmental affairs
Department:
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REPUBLIC OF SOUTH AFRICA

New aquatic invader in South Africa

A previously unrecorded alien species of salvinia, a floating aquatic fern, has been discovered at Hartbeespoort Dam in the North West Province. The discovery was made in December 2011 by retired ARC-PPRI entomologist and biocontrol scientist, Dr Carina Cilliers, while undertaking zooplankton studies of water samples from the dam.

Fern taxonomist, Dr Ronell Klopper of SANBI in Pretoria has confirmed that the Hartbeespoort Dam plants are neither *S. molesta*, which has long been invasive in southern Africa, nor *S. hastata*, which is indigenous to east Africa. The new plants have been provisionally identified as *S. minima*, whose native range extends from Mexico through Meso-America to northern Argentina. *S. minima* is invasive in the USA and a declared noxious weed in several states.

The new salvinia is well-established at Hartbeespoort Dam and forms dense mats within marginal vegetation. The plants are smaller and more scattered at other sites around the dam where there is more water movement. The new salvinia is smaller than the common salvinia or Kariba weed and can be distinguished most readily by the specialised leaf hairs—see page 2 for details.

The Weeds and Invasive Plants website: www.agis.agric.za/wip is currently not being managed due to ongoing operational problems at AGIS.

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'.

Inside this issue:

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Articles and photos by Lesley Henderson unless otherwise acknowledged

Small salvinia—a new aquatic invader in South Africa

There are 10 species of salvinia worldwide. There is only one African species, *S. hastata*, which occurs naturally on the Shire and lower Zambezi rivers in tropical east Africa. *S. molesta* is commonly known in southern Africa as salvinia or Kariba weed after its spectacular invasion of Lake Kariba in 1959. It is native to South America but has spread throughout the tropics and subtropics, in part due to trade in ornamental plants for ponds and aquaria. It is prohibited and a declared category 1 invasive plant in South Africa. Biological control using the leaf-feeding weevil, *Cyrtobagous salviniae*, is completely successful and requires no other intervention (see page 5).

The newly recorded salvinia (**photos 1, 2 & 3**) at Hartbeespoort Dam could easily be mistaken for *S. molesta*. However, even under the extremely high nutrient conditions of the dam, its smallest leaves are only ~8 mm wide, with the largest leaves only reaching ~15 mm wide. *S. molesta*, under the same conditions would be expected to have leaves 20—40 mm wide or more.

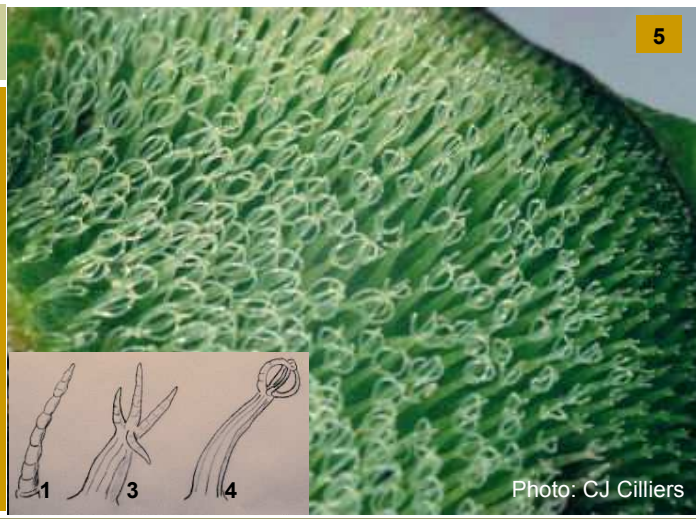
Small salvinia plants inbetween water hyacinth (**photo 1**). Leaves are smaller and lie flat in low density populations (**photos 1 & 2**)

Leaves are larger and folded vertically in high density populations (**photo 3**)

The upper leaf surfaces of the floating leaves of *Salvinia* species are densely covered with specialised hairs that make the leaves water repellent and bouyant. *Salvinia* species can be divided into four groups based on the types of specialised hairs on the upper leaf surfaces. The four hair types are:

1) unbranched, solitary, 2) unbranched, in pairs which are fused at their tips, 3) branched into four fingers which are free at the tips, 'medusa's head' type, and 4) branched into four fingers which are fused at the tips, 'egg-beater' type.

The indigenous African *Salvinia hastata,* has type **1** hairs; *S. minima* and the Hartbeespoort Dam plants have type **3** hairs (**photo 4**), and *S. molesta* has type **4** hairs (**photo 5**).



There is hope for the biocontrol of the Hartbeespoort Dam species if it is indeed *Salvinia minima*. There is evidence from the USA that *S. minima* is controlled by the same leaf-feeding weevil species, *Cyrtobagous salviniae*, which provides effective control of *S. molesta* in South Africa (see page 5).

Emerging invasive alien species in adjoining areas of North West, Free State and Northern Cape Provinces

Chilean inkberry

Chilean inkberry (*Cestrum parqui*) is an evergreen shrub up to 3 m high. It is native to South America and belongs to the family Solanacaeae.

Leaves are narrowly lance-shaped, up to 150 mm long and 15—25 mm wide. Flowers are tubular, greenish yellow or brownish, in compact axillary and terminal clusters. Fruits are small berries, green turning purple-black.

Toxic to cattle, sheep, goats, horses, pigs, poultry (leaves) and humans. Extremely toxic to cattle, especially during the winter months of June and July, and early spring.

This toxic species is invasive in Gauteng and is expanding its distribution into the North West Province at Vryburg and Schweizer-Reneke.

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 common inkberry (*Cestrum laevigatum*) in South Africa.

Legislation: Category 1 prohibited plant under Conservation of Agricultural Resources Act (CARA).

Spiny blue-leaf cactus

Blue-leaf cactus (*Opuntia robusta*) is a succulent shrub, almost tree-like, developing a distinct trunk with age and reaching a height of 4 m. It is native to Mexico and belongs to the family Cactaceae.

Stem sections (cladodes) are blue-green, almost round, 200—400 mm wide. Flowers are pale yellow. Fruits are ~ globose, pink to purple or deep red.

Spineless cultivars have been widely cultivated for fodder in the semi-arid and arid interior of South Africa and are widely naturalised.

Spiny plants, which are closer to the wild species, have been observed for the first time in the Free State near Boshof and Hertzogville. These plants are potentially invasive and have been proposed as category 1 prohibited plants under CARA.

Multi-headed sunflower

Multi-headed sunflower (*Helianthus annuus*) is the wild relative of the sunflower crop plant and differs from it in growing taller, with many smaller flowerheads and smaller seeds.

It occurs on roadsides, streambanks and other disturbed sites. Dense stands occur on vacant land on the outskirts of Vryburg and other towns.

It has been cultivated as an ornamental plant and sold as a cutflower. It has become invasive in other parts of the world. It could become as abundant as the Mexican sunflowers (*Tithonia* spp.) in South Africa.

More emerging invasive alien species in North West, Free State and Northern Cape Provinces

Boxing-glove cactus

Boxing-glove cactus (*Cylindropuntia fulgida* var. *mamillata*) is a spiny succulent shrub or tree 1—3 m high with a distinct trunk. It is native to Mexico and the southern USA and belongs to the family Cactacaeae.

Legislation: Category 1 prohibited plant under Conservation of Agricultural Resources Act (CARA).

Stem sections (cladodes) are cylindrical with short spines and appear to be spineless from a distance. Some cladodes are broad and deformed ("crested"), looking like boxing-gloves.

The normal variety, var. *fulgida*, chain-fruit cholla, also incorrectly known in the past as "rosea cactus" is very densely spiny and the cladodes are totally obscured by the spines.

Bird-of-paradise flower

Bird-of-paradise flower (*Caesalpinia gilliesii*) is a glandular-hairy, spineless shrub up to about 3 m high. It is native to South America and belongs to the family Fabaceae (or Caesalpiniaceae).

Legislation: Proposed category 1 prohibited plant under Conservation of Agricultural Resources Act (CARA).

Leaves are twice-divided, 100—250 mm long. Flowers are fragrant in terminal clusters; each flower with five yellow petals and ten long, showy red stamens. Pods are brown, ~hairy, flattened, up to 100 mm long.

It has been cultivated as an ornamental shrub mainly in the semi-arid and arid interior of South Africa. It is invading watercourses, roadsides and other disturbed sites. Seeds and green pods are toxic.

Golden crown beard

Golden crown beard (*Verbesina encelioides*) is an annual erect herb up to 1 m high. It is native to Mexico and belongs to the daisy family Asteraceae.

Leaves are silvery green-hairy above and densely white-hairy beneath, ovate to lanceolate, with coarsely toothed margins. Flower heads measure about 50 mm across, on long stalks. The broad, yellow ray florets are ~12 mm long and are trilobed at their tips. Seeds are winged along the margins.

It has been cultivated as an ornamental and is now invading roadsides, cultivated and fallow lands, and other disturbed sites. It is already very widespread and abundant but has the potential for much more spread. It is mildly toxic to small ruminants.

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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

Quick link:

Invasive alien plants

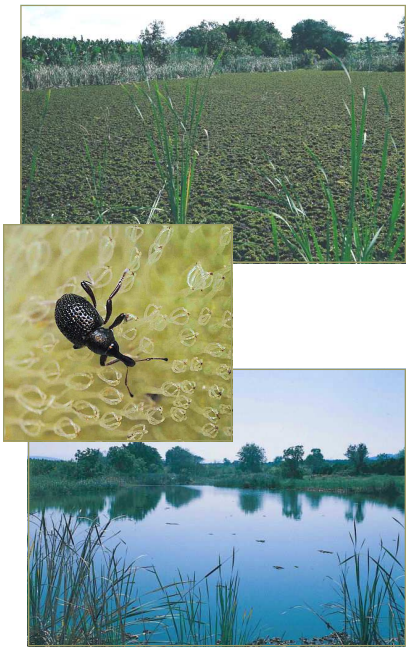
see Plant Protection News

for current news from the Weeds Research Programme

Read *Plant Protection News* No. 91 for the following news from the Weeds Research Programme:

- First releases of a biocontrol agent (a rust fungus) against parthenium weed (*Parthenium hysterophorus*)
- Collecting a gall-inducing scale against Australian myrtle (*Leptospermum laevigatum*)

Biological control of invasive plants



Salvinia (*Salvinia molesta*) before and after biocontrol with the weevil *Cyrtobagous salviniae*
Photos: C.J. Cilliers

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.