

April 2018

No. 48



SOUTHERN AFRICAN PLANT INVADERS ATLAS

Newsletter of the Southern African Plant Invaders Atlas, an initiative of the Weeds Research Division of Plant Protection Research, an institute within the Agricultural Research Council (ARC)

Shocking *Nassella* invasion threatens South Africa's mountain grasslands

Inside this issue:

Shocking *Nassella* invasion threatens South Africa's mountain grasslands 1

Nassella:
History and threats
Current status?
How to recognize and search for *nassella* tussock PhD project 2-5

More invasions:
Kikuyu grass
Teddy bear cactus
Sword fern
Star wort
Blue periwinkle 6

SANBI DBI thanks spotters for reporting invasions 7-8

Good news for control of black wattle 8

Editor and SAPIA co-ordinator:
Lesley Henderson
ARC-PPRI
Weeds Research Division
stationed at 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

Fax: 012 804 3211
SAPIA newsletters are posted at
ARC website: www.arc.agric.za and
Invasive Species Website:
invasives.co.za



Photo: Ralph Clark

Nassella invasion at Golden Gate National Park in the eastern Free State was discovered in October 2017 by Dr Ralph Clark, Director of the University of the Free State's AfriMontane Research Unit based at the QwaQwa campus. First impressions are that 25% of the total area of Golden Gate has been invaded by this alien grass and some parts, on the Clarens side, have been completely overrun. Fertile specimens are yet to be collected but there is little doubt that it is *Nassella trichotoma*, commonly known as *nassella* tussock or serrated tussock.

Call for PhD student

Given the poor current state of knowledge on the distribution of *Nassella* in southern Africa, including the drivers of invasiveness, impacts, potential responses to climate change, and management needs, the AfriMontane Research Unit is advertising for a suitable PhD candidate to assess this critical genus.

Go to page 5 for more information and contact details.



Nassella invasion in South Africa: History and threats

Three species of South American grasses belonging to the genus *Nassella* are known to be invasive in South Africa—*Nassella trichotoma* (= *Stipa trichotoma*), *N. tenuissima* (= *Stipa tenuissima*) and *N. neesiana* (= *Stipa neesiana*). The first two, and possibly all three, are thought to have been accidentally introduced into South Africa during the Anglo-Boer war (1899-1902) as seed contaminants in fodder.

Historical occurrence in South Africa

Nassella tussock or serrated tussock (*Nassella trichotoma*) is the most widespread and troublesome species in South Africa. It was first recorded as naturalized in 1928 and by 1985 it had invaded about 70 000 hectares mainly in the eastern Cape, Karoo and Winter Rainfall regions. Infestations occurred in the Swellendam, Cape Town, Graaff-Reinet, Pearston, Bedford, Somerset East, Cathcart, Happy Valley, Sterkstroom, Stutterheim, Thomas River, Queenstown, Dordrecht, Molteno and Barkly East districts.

What are the dangers?

Nassella tussock is a tremendous threat to natural grazing in South Africa. Due to its vigorous growth and large amount of seed produced, it spreads very rapidly in disturbed environments and overgrazed areas to form dense stands. Its fibre content is so high (35%) and its protein content so low (4%) that it is seldom grazed. If animals are forced to eat it they lose condition rapidly and may even die from undigested fibre completely blocking the gut. The sharp seed awns are a troublesome impurity in wool and cause severe irritation to the skin of young lambs. The unpalatability of *nassella* forces animals to concentrate their grazing on other, more palatable plants—aggravating existing overgrazing and opening the way for further *nassella* invasion. Once an area has become infested with *nassella*, the cost of control can be enormous, often exceeding the value of the land.

Legislation

Nassella tussock (*Nassella trichotoma*), and white tussock (*N. tenuissima*), are listed invasive plants whose control has been enforced by law since 1977 under the Weeds Act of 1937, and subsequently under the Conservation of Agricultural Resources Act (CARA) of 1983 and the National Environmental Management: Biodiversity Act (NEM:BA) of 2004.

Control

A vigorous awareness and control campaign was launched against *nassella* tussock by the Department of Agriculture in the 1970s and 1980s. The Government provided landowners with task teams and subsidized herbicide for all infestations. Tetrapion gave the best control and was even shown by Viljoen (1987) to be as effective and more selective at a lower rate of application than was initially registered. Although it took about 15 months to kill the plants completely it had the advantage that the germination and establishment of seedlings was delayed for a considerable time. It was also much less damaging to valuable non-target indigenous grass species.

All progress with control of *nassella* tussock made during the 1980s into the 1990s petered out. The Government subsidy of herbicide stopped and the campaign came to an end apparently due to unavailability of tetrapion. Since early 2000 there appears to have been no enforced control of either *nassella* tussock or white tussock.

A new generic herbicide, called Enviroguard (active ingredient: Tetrapion (Flupropanate) 745 g/liter), has been registered for *nassella* tussock. It was originally registered in South Africa under the name of 'Nosella'. The trade name in Australia is "Taskforce".



Photo: Mike Wells



Photo: Mike Wells

Nassella tussock infestations in the 1980s at Happy Valley (photo 1) and Hogsback (photo 2). These were amongst the first infestations to be controlled in the late 1970s.

Quotes from Mike Wells:

"Nassella tussock is a self perpetuating factory of valueless fibre"

"Nassella tussock can force farmers off the land, and jeopardise the economy of the country, if it is not contained"

Nassella invasion in South Africa: Current status?

What is the status of *Nassella* today?

Since 2000 there has been little information available on the status of *Nassella* species in South Africa. Wells in 1987 warned that 36% of the total area of South Africa—44 million hectares—has climatic conditions and vegetation that make it suitable for infestation by nassella tussock. He predicted that if it was not controlled it could infest an area of 2 million hectares within the next 40 years. Has this prediction come true?

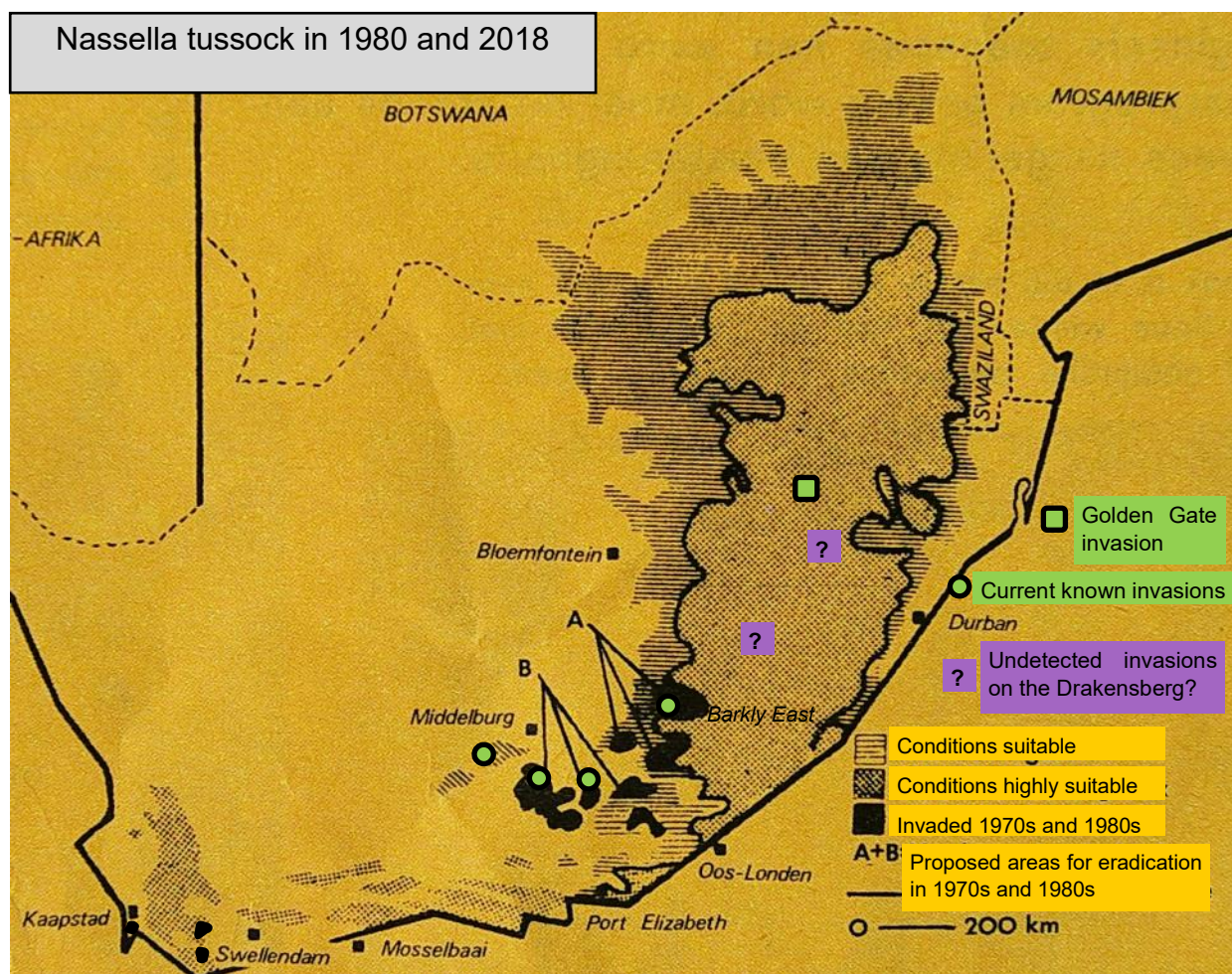
Where is nassella tussock likely to occur?

Although nassella tussock prefers high rainfall areas of more than 500 mm per year, it grows easily in a wide range of climatic conditions, soil types and topographical situations. It can tolerate extreme conditions, e.g. floods, drought, exposure to salt spray and repeated, heavy frost. *Nassella* first invades damp areas where the natural vegetation has been disturbed e.g. by over-grazing, and then spreads to drier areas. It survives drought better than other pasture species.

At Golden Gate (photo 3), the invasion is extensive, sometimes dominant, on most of the hillslopes that are visible north of the Clarens-QwaQwa road, right up to the summit in places (~ 2 300 m).



Photo: Ralph Clark



Map adapted from Landbouweekblad 1980, 'Nassella kán uitgeroei word'. The current full extent of nassella tussock is unknown. In the Eastern Cape it has been reported from the Barkly East and Somerset East districts (Carl Stoltz, personal communication) and on the Sneeuberge, Great Winterberg, Amatholes and possibly the Stormberg (Ralph Clark, personal communication). The Golden Gate invasion was first detected in 2017 but was already extensive. It is very likely that there are undetected invasions on the Drakensberg situated between Golden Gate and Barkly East within Lesotho and the former Transkei.

Nassella tussock: How to recognize and search for it

How to recognize nassella tussock:

- Densely tufted, perennial grass up to 60 cm high (**photo 4**); mature tussocks droop and appear as though they have been lain on (**photo 5**).
- Leaves tightly rolled, bristly, and harsh to touch downwards. Ligule (junction of blade and sheath): papery 0.5–1 mm long, without a ring or tuft of hairs.
- The inflorescence is open, loosely branching (**photo 6**), at maturity standing well clear of the leaves, Nov–Dec; breaking off and leaving tussocks clean of old flowering stalks for most of the year.
- The seed (**photo 6 inset**) has a single, unbranched awn 2–3 cm long. The awn is straight or slightly bent but never with a definite 'elbow' bend as in white tussock (*N. tenuissima*).
- Very strong root system; tussocks difficult to pull out. Tussock bases are whitish and break up easily into separate, compact tufts.

Confusing species:

Nassella tussock looks superficially like the indigenous tussock grass *Tenaxia stricta* (= *Merxmuellera stricta*) and often occurs with it in rocky mountainous areas.

T. stricta is however clearly olive-green (not pale green to white), and the leaves are erect and often needle-like (and can be sharp). *T. stricta* is typically associated with rocky outcrops, cliffs, overhangs and other rock-dominated areas at higher altitudes.

Nassella tussock is typically lax and floppy. While it can invade rocky areas it prefers deeper soils.

How to search for it:

- On mountain tops that receive high rainfall, below cliffs where there is seepage or shading, or in valley lines on mountain slopes.
- Along vehicle tracks and stock paths, near watering points, in paddocks, old lands and contours.
- By fences, windbreaks and other obstructions where seed heads will lodge.
- Streambeds where seeds are likely to have been washed.
- Where imported fodder has been dumped.
- In mid-summer when tussocks are in full flower and in autumn when tussocks bleach before other grasses.



4



5



6

One tussock produces up to 100 000 seeds per year. Whole seed heads can be carried 30 km or more by the wind to invade isolated mountain tops. Seeds are also dispersed by trains, cars, agricultural machinery, floodwaters, in fleeces, mud or soil and socks!

Seeds remain viable in the soil for 10 years and longer and pass through animals unharmed.

PhD study to assess *Nassella* in southern Africa

Given the poor current state of knowledge on the distribution of *Nassella* in southern Africa, including the drivers of invasiveness, impacts, potential responses to climate change, and management needs, the University of the Free State's Afromontane Research Unit is advertising for a suitable PhD candidate to assess this critical genus.

The candidate should be self-motivated, be fit (think mountains!), be willing to spend extensive time travelling, be comfortable with extensive field time in remote mountainous regions, and have a driver's license. Prior experience in invasive species ecology, montane grassland ecology and/or modelling species responses to climate change would be preferable.

Prospective candidates can contact Dr Sandy Steenhuisen at SteenhuisenS@ufs.ac.za or Dr Ralph Clark ClarkVR@ufs.ac.za for the full advert. The closing date for applications is 15 May 2018.



Golden Gate National Park in eastern Free State

Selected literature on nassella tussock in South Africa

- Anonymous, 1980. *Nassella* kán uitgeroei word. *Landbouweekblad*, 18 April, 1980.
- Campbell, M.H. & Viljoen, B.D. 2006. Effect of flupropanate formulations on serrated tussock (*Nassella trichotoma* (Nees) Arech. in South Africa and Australia. *Plant Protection Quarterly* Vol 21 (1), 2–5.
- Harding, G.B. 1983. Aspects of the autecology of *Stipa trichotoma* Nees (nassella tussock) on Rhodes Estate. *Proceedings of the 5th National Weeds Conference of South Africa*.
- Joubert, D.C. 1984. The seed bank under nassella tussock infestations at Boschberg. *South African Journal of Plant and Soil* 1: 1–3.
- Viljoen, B.D. 1987. Effect of rate and time of application of tetrapion on nassella tussock (*Stipa trichotoma* Nees) in South Africa. *South African Journal of Plant and Soil*, 4 (2), 79–81.
- Viljoen, B.D. 1987. Pasture recovery after nassella tussock control with tetrapion. *Applied Plant Science* 1: 18–22
- Wells, M.J. 1976. *Nassella tussock threatens you!* Pamphlet, Department Of Agricultural Technical Services, Pretoria.
- Wells, M.J. 1977. Progress with research on nassella tussock. *Proceedings of the Second National Weeds Conference of South Africa, Stellenbosch, 1977*, pp. 47–55.
- Wells, M.J. 1978. *Nassella* tussock. In C.H. Stirton (ed.), *Plant invaders: beautiful but dangerous*, pp. 140–143. The Department of Nature and Environmental Conservation of the Cape Provincial Administration, Cape Town.
- Wells, M.J. & De Beer, H. 1987. *Nassella* tussock. Weeds A.21/1987, *Farming in South Africa*.

More invasions

The SAPIA survey in March 2018 to the eastern Free State, Karoo and Southern Cape/ Garden Route revealed the widespread cultivation and uncontrolled spread of listed invasive plants. The following photos were selected to illustrate just some of the worst invasions. Law enforcement and compliance has failed miserably in South Africa. How can you help? Awareness, education, public support and persuasion will go a long way to help. Many of the worst invasions emanate from the dumping of unwanted garden plants.

Kikuyu grass (*Pennisetum clandestinum*) is a valuable lawn and fodder grass but is very invasive, particularly in wetland areas (**photo 1**). Teddy bear cactus (*Opuntia microdasys*) is a popular ornamental plant in arid areas but gets tossed over the garden fence when it becomes too nasty to live with (**photo 2**).

Much has been said about the invasive trees and shrubs along the Garden Route but the equally invasive groundcovers tend to be overlooked. Sword fern (*Nephrolepis cordifolia*) can form dense stands that completely dominate the forest floor (**photo 3**). The same applies to star wort (*Tradescantia fluminensis*) (**photo 4**) and blue periwinkle (*Vinca major*) (**photo 5**) which grow and spread from discarded fragments.



1



2



3



4



5

Thank you for reporting alien species SANBI DBI (inland) appreciates your efforts

Moleseng Claude Moshobane (Directorate: Biological Invasions (DBI), South African National Biodiversity Institute)



The role of spotters:

Early Detection and Rapid Response (EDRR) is an integral part of managing alien and invasive species. However, it requires a lot of resources to have eyes everywhere in a country, and can be very cumbersome for developing countries. Alternatively, volunteer spotters come in very handy for detecting new invaders. Therefore, spotters (volunteers) play a key role in EDRR, which is an approach widely practiced around the world (Thomas *et al.* 2017). Furthermore, the spotters indirectly help to generate the distributional and ecological data of alien species on a national scale (Sarat *et al.* 2017). This, furthermore, helps biodiversity managers to delimit the spread of invasive alien species thus reducing their impacts in the country (Anderson *et al.* 2017; Sarat *et al.* 2017; Thomas *et al.* 2017; Varray & Hudin 2017).

The SANBI DBI (inland), managed to clear the following species, reported by spotters. More will be cleared in due time.

Province	Location	Species (Botanical name & Common name)	Progress (First clearing attempt, second etc.)	Control Method
Limpopo	Blouberg	<i>Harrisia pomanensis</i> (midnight lady)	Second clearing attempts 23/01/2018	Chemical (Impala (350%))
Limpopo	Haenertsburg	<i>Coreopsis lanceolata</i> (tick seed)	First clearing attempt 31/01/2018	Mechanical (hand pull)
Free State	Golden Gate	<i>Berberis julianae</i> (Chinese barberry)	Third attempt	Chemical (Kaput gel)
Free State	Jacobsdal	<i>Tephrocactus articulatus</i> (pine cone cactus)	First attempt	Chemical (Garlon)
Free State	Jacobsdal	<i>Cylindropuntia pallida</i> (pink-flowered sheathed cholla)	First attempt	Chemical (Garlon)
Mpumalanga	Enhlazeni	<i>Pueraria montana</i> var. <i>lobata</i> (Kudzu vine)	Second attempt 26/02/2018	Chemical (Garlon)
Mpumalanga	Thaba chewu	<i>Coreopsis lanceolata</i> (tick seed)	Second attempt 26/02/2018	Mechanical (hand pull)
Mpumalanga	Steve Tshwete	<i>Furcraea foetida</i> (Mauritius hemp)	Second attempt 26/02/2018	Chemical (Plenum)
Gauteng	Pretoria	<i>Opuntia pubescens</i> (velvet bur cactus)	First attempt 26/02/2018	Mechanical (hand pull)
North West	Groot Marico	<i>Harrisia balansae</i> (strangler prickly apple)	Second attempt 26/02/2018	Chemical (Glyphosate)



Cylindropuntia pallida (pink-flowered sheathed cholla)



Coreopsis lanceolata (tick seed)

SANBI DBI (inland) thanks spotters

References

- Anderson L.G., Chapman J.K., Escontrela D. & Gough C.L.A. 2017 The role of conservation volunteers in the detection, monitoring and management of invasive alien lionfish. *Management of Biological Invasions* 8:In press. doi: 10.3391/mbi.2017.8.4.14
- Sarat E., Dutartre A., Soubeyran Y. & Poulet N. 2017. A French working group on biological invasions in aquatic environments: towards an improvement of knowledge and management of freshwater invasive alien species. *Management of Biological Invasions* 8:415–424. doi: 10.3391/mbi.2017.8.3.15
- Thomas M.L., Gunawardene N., Horton K. et al. 2017 Many eyes on the ground: citizen science is an effective early detection tool for biosecurity. *Biological Invasions* 19:1–15. doi: 10.1007/s10530-017-1481-6
- Varray S. & Hudin S. 2017. From networking to a coordinated management strategy for the invasive alien species of the Loire-Brittany basin. *Management of Biological Invasions* 8:409–413. doi: <https://doi.org/10.3391/mbi.2017.8.3.14>

Good news for the control of black wattle (*Acacia mearnsii*)

A collaborative project between the Agricultural Research Council and the Zoology Department of the University of Cape Town brings much hope for curtailing the spread of black wattle (*Acacia mearnsii*), one of the most prolific invaders in South Africa.

A tiny gall fly (*Dasineura rubiformis*), native to Australia, was introduced into South Africa for the biological control of black wattle a number of years ago. By 2006 a population was established in Stellenbosch and had spread to other sites in the Western Cape. Because its natural dispersal is low it has been manually distributed to many sites across the country.

The insects cause galling of the flowers which prevents the production of seed pods. Although this reduction in seeding will not immediately result in a decline in the density of black wattle, it will curb its invasiveness and rate of spread, and thereby prevent the problem escalating further. Galling has no negative impacts on the vegetative parts of the trees, allowing the economic benefits of the plants (i.e. as a source of wood chips, tannin, timber and firewood) to be retained while it is brought under control.

Pod-bearing trees (**photo 1**) will become a thing of the past while trees heavily laden with galls will become a common sight such as (**photo 2**) which was taken in George on the recent SAPIA survey.

References:

<http://www.invasives.org.za/legislation/item/454-tiny-gall-fly-has-a-big-impact-on-invasive-black-wattle>

Impson, F.A.C., Post, J.A. & Hoffmann, J.H. 2013. Impact of the flower-galling midge, *Dasineura rubiformis* Kolesik, on the growth of its host plant, *Acacia mearnsii* De Wild, in South Africa. *South African Journal of Botany* 87: 118–121.



ARC-PPRI, WEEDS RESEARCH DIVISION



Plant Protection Research

The Weeds Research Division of the ARC-Plant Protection Research (PPR) is responsible for research on the ecology and control of invasive alien plants in South Africa.

Research Team Manager: Dr Roger Price, e-mail: PriceR@arc.agric.za