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PUCCINIA MESEMBRYANTHEMI CAUSING A NEW DISEASE INHIBITING THE GROWTH OF SCELETIUM TORTUOSUM IN SOUTH AFRICA

Pedro W. Crous[1], Sandra Denman[1] and Mike Scott[2]

[1]Department of Plant Pathology, University of Stellenbosch, P. Bag X1, Matieland 7602, South Africa
[2]Grassroots Natural Products, P.O. Box 16, Gouda 6821, South Africa

ABSTRACT

Puccinia mesembryanthemi is newly reported as a rust disease of *Sceletium tortuosum* from Namaqualand and the south coast of South Africa. Although this pathogen has serious implications for the commercial cultivation of *Sceletium* spp., preliminary trials have given positive results with unregistered fungicides such as tebuconazole and bitertanol. *P. mesembryanthemi* is a pathogen also associated with other members of the family Mesembryanthemoideae.

Keywords: *Puccinia*, systematics, traditional medicine

INTRODUCTION

The genus *Sceletium* N.E. Br. is a member of the family Mesembryanthemoideae. It is characterised by several scrambling or clustered perennial species with flat, succulent leaves that remain as a skeleton in the dry season (Gerbaulet, 1996). *Sceletium* is indigenous to South Africa, and species occur in the Western, Eastern and Northern Cape Provinces, certain parts of the Knersvlakte, the Ceres Karoo,

Namaqualand Rocky Hills, and along the south coast (Arnold & De Wet, 1993).

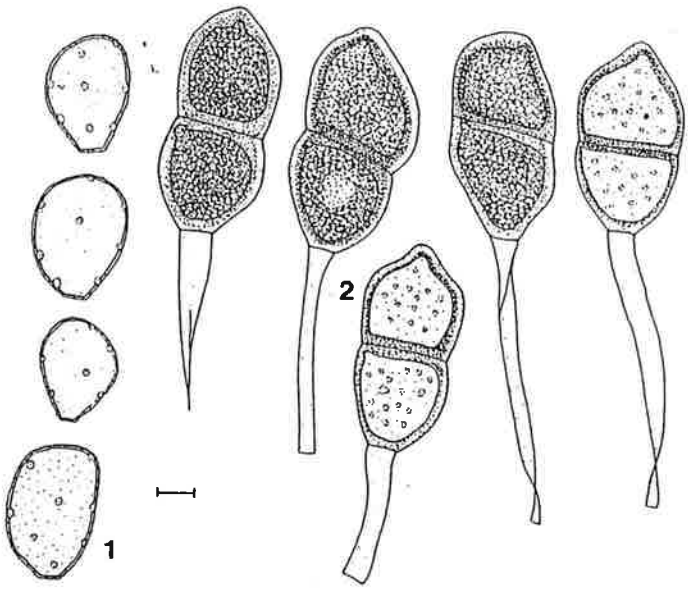
Sceletium, locally referred to as "kougoed", is traditionally used by some of the local inhabitants in Namaqualand as a medicinal plant. *S. tortuosum* (L.) N.E. Br. ex Schwantes has been used to relieve stomach aches, and as fodder for sheep during dry periods (Gerbaulet, 1996). Watt & Breyer-Brandwijk (1962) reported that farmers have used a decoction of *S. tortuosum* as a sedative, while it is also used as an intoxicant to relieve pain, or to increase one's strength.

Recently, a rust disease of *S. tortuosum* was brought to our attention by a local company, who claimed that it is associated with severe disease symptoms and losses in areas where this host plant is being multiplied for commercial uses. No rust diseases have been reported from *Sceletium* spp., although one species, *Puccinia mesembryanthemi* MacOwan is known from several genera in the Mesembryanthemoideae (Doidge, 1927, 1950). The aim of the present study was to identify this new rust pathogen, as well as to investigate possible ways of controlling the disease.

Using the keys developed by Cummins & Hiratsuka (1983), and the description and illustration provided by Doidge (1927), the rust disease on *Sceletium* was found to represent a new host record for *P. mesembryanthemi*. A morphological description based on the new collections is given below.

Puccinia mesembryanthemi MacOwan, in Syd., Monogr. Ured. **1**: 562 (1904). Figs 1-5.

Spermogonia and Aecia not observed on *Sceletium*. Aecia have been observed on *Mesembrianthemum*, and are described by Doidge (1927). Uredinia amphigenous, medium brown, scattered or in small groups, circular to slightly irregular, surrounded by a torn epidermis, 300-800 µm diam. Urediniospores broadly ellipsoid to globoid with



Figs 1, 2. *Puccinia mesembryanthemi.* **1.** Urediniospores. **2.** Teliospores. Bar = 10 µm.

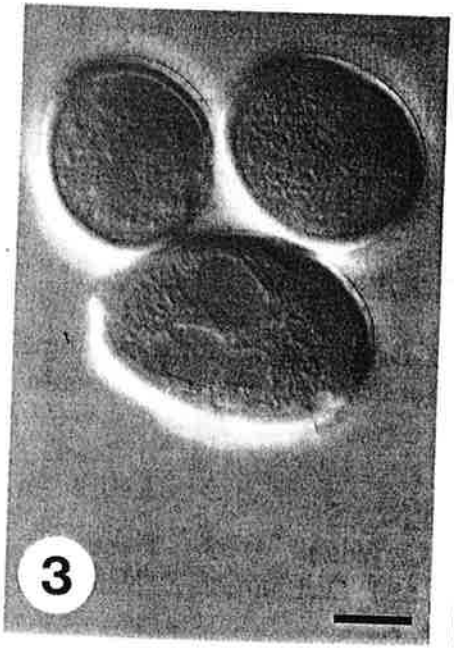
truncate bases, golden-brown, (25-)28-35(-38) x (20-)22-26 (-28) µm; wall 1.5-2 µm diam., inconspicuously echinulate, spines up to 1 µm long; pores scattered, circular, 6-10 per spore, 3-4.5 µm diam.; spines also present over pores. Telia amphigenous, scattered, 1(-3) mm diam., black, erumpent, cushion-like. Teliospores clavate, apex rounded or bluntly acute, attenuate towards the base, constricted at horizontal septum, medium brown, upper cell slightly darker than lower cell, (40-)50-60(-65) x (21-)26-28(-32) µm; upper cell sub-globose to ellipsoid, (21-)26-28(-32) µm wide; lower cell cuneiform, (20-)22-25(-27) µm wide; wall smooth, 2-2.5 µm diam., thickened at apex (5-8 µm); germ pore apical in upper cell and just below the septum in lower cell; pedicel olivaceous, persistent, 10-110 µm long, 6-11 µm diam. at spore base.

Specimen examined. Namaqualand, Platbakkies, Kougoedvlakte Farm, (GPS reading: 30°-20-42' S and 18°-21-15' E), living leaves of *Sceletium tortuosum*, M. Scott, Nov. 1995, PREM 55338 (telia developed on this material after it was planted out in the Gouda district during May-June 1996).

Although numerous species of *Puccinia* have been described from diverse hosts in Southern Africa (Doidge, 1950), *P. mesembryanthemi* represents the first record of a disease on *Sceletium*. According to Cummins (1936), rust species with urediniospores that have numerous and scattered germ pores are representative of the more primitive forms. If this is indeed the case, it is possible that *P. mesembryanthemi* did not recently adapt to *Sceletium*, but has been present on this host for many years. It has only recently been perceived as a problem due to commercial farming of these species.

Control of pathogen. A preliminary trial was conducted in the nursery using six fungicides, namely copper oxychloride with nitrogen (Copper Count-N® ec; 5 ml/L), sulphur (Efekto Eco®; 4.3 g /L), mancozeb (Dithane 45® wp; 3 g/L), tebuconazole (Folicure® ec; 1.5 ml/L), bitertanol (Baycor® 300 ec; 1 ml/L) and triforine (Funginex® 190 ec; 1.5 ml/L). Plants were grown in a peat/vermiculite planting mixture in polystyrene trays (98 cavity size), with two replicate trays for each treatment, and one tray as a control. Trays were maintained in a greenhouse at temperatures that ranged from 12-35°C. Plants in each treatment were sprayed till run-off with a hand atomiser. Fungicides were applied every 7-10 days, and the amount of disease was visually assessed after 2 months. Plants were compared with the controls and rated as follows: (a) less rust pustules than the controls, (b) similar

Figs 3-5. *Puccinia mesembryanthemi*. **3.** Urediniospores. **4.** Surface view of urediniospores showing spines and pores (arrows). **5.** Teliospores. Bars = 10 µm.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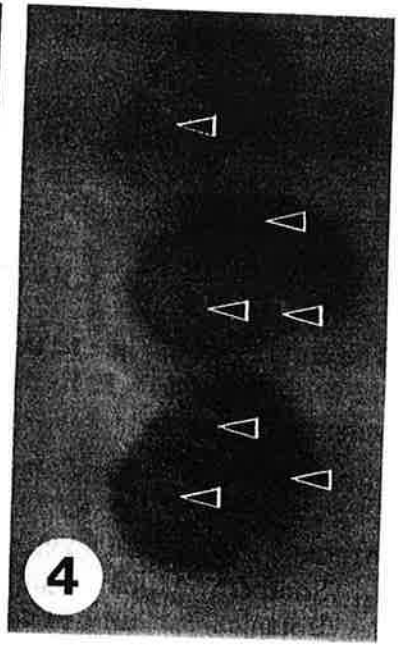
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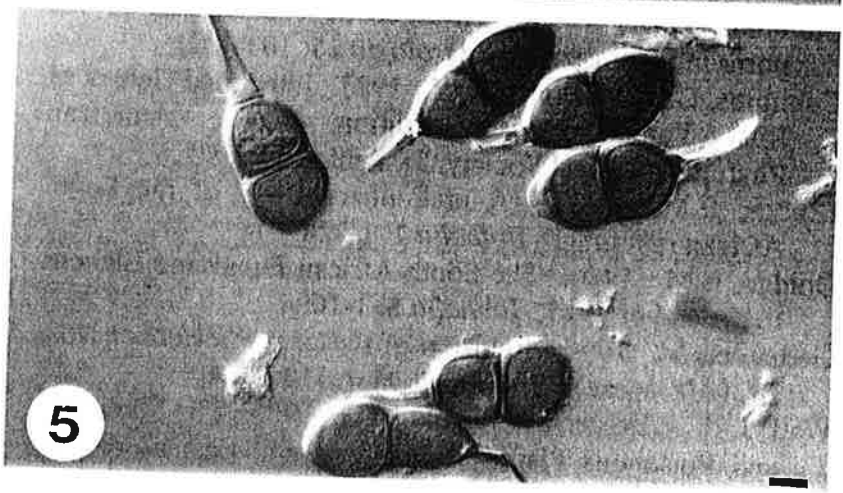
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amount of rust pustules to that of the controls, (c) more rust pustules than the controls, and (d) seedling death. From the preliminary data obtained in this study, only tebuconazole and bitertanol applications led to a marked reduction in disease (approximately 50 %) compared with the controls. Further evaluation of these compounds under field conditions is presently underway.

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