FIRST REPORT OF MYCOSPHAERELLA GIBSONII IN SOUTH AFRICA

M. H. IVORY1 and M. J. WINGFIELD2

ABSTRACT

Key words: Mycosphaerella gibsonii, Cerceospora pini-densiflorae, *Pinus* spp., needle blight

*Mycosphaerella gibsonii*, the cause of brown needle disease, is reported for the first time from South Africa. The disease was found on *Pinus canariensis*, *P. griffithii*, *P. pinaster* and *P. radiata* in the Southern-Cape, Eastern Cape and Eastern Transvaal forest regions, and is briefly described.

Utretsel

EERSTE AANMELDING VAN MYCOSPHAERELLA GIBSONII UIT SUID-AFRIKA

*Mycosphaerella gibsonii*, die oorsaak van bruin naaldziekte, word vir die eerste keer uit Suid-Afrika aangemeld. Die ziekte is gevind op *Pinus canariensis*, *P. griffithii*, *P. pinaster* en *P. radiata* in die Suid-Kaapse, Oos-Kaapse en die Oos-Transvaalse bosboustreke en word kortliks beskryf.

INTRODUCTION

Brown needle disease was first observed affecting young *Pinus densiflora* Sieb. & Zucc. in Japan in 1913 (Ito, 1972). The causal fungus was subsequently identified as *Cercospora pini-densiflorae* Hori & Nambu (Nambu, 1917) and later renamed *Cercesporia pini-densiflorae* (Hori & Nambu) Deighton (Deighton, 1976). Brown needle disease apparently remained confined to Japan and Taiwan until about 1960, but was later found in East Africa (Gill, 1963), Malaysia (Anonymous, 1967) and Central Africa (Gibson, 1979) affecting *P. caribaea* More., *P. occarpa* Schiede and *P. radiata* Don. *C. pini-densiflorae* has recently been observed in a natural pine forest in Central America where it might be indigenous (Evans, 1984).

Evans (1984) has suggested that, in addition to the anamorph, this fungus might produce a synanamorph (*Asteronella* sp.), and a teleomorph (*Mycosphaerella gibsonii* H. Evans) within the same stroma. Although the connection between anamorph and teleomorph has not been conclusively demonstrated, there is strong circumstantial evidence to support the association of these states. Evans (1984) re-examined collections disposed as *C. pini-densiflorae* and *Mycosphaerella pinicola* (Faur.) Naour. in the Commonwealth Mycological Institute (CMI) herbarium and found that the teleomorph, *M. gibsonii*, has been present in East Africa and Central Africa since 1962, and South East Asia since 1966, always in association with the *Cercesporia* anamorph. The teleomorph has, however, not been found in any of the Japanese collections.

*C. pini-densiflorae* can cause severe defoliation and death of late nursery stock and young plantations of a number of susceptible pine species (Ivy, 1972; Gibson, 1979). Most species, however, become resistant within a few years (Suto, 1982). The disease spreads by means of rain-splashed conidia during wet weather and requires two or three days of moist humid conditions for dispersal and infection, with symptoms appearing after about 5 wks (Ivy, 1972).

During a recent tour to investigate the occurrence of diseases in forest plantations in various parts of South Africa, *M. gibsonii* was found on several pine species. This fungus has not previously been recorded from South Africa.

MATERIALS AND METHODS

Pines in the Western, Southern and Eastern Cape, Natal, Eastern and Northern Transvaal were checked for the presence of pathogens by examination of obviously diseased trees, and collection of foliage and litter samples from apparently healthy trees. Where possible, trees in arbores were examined to increase the number of pine species surveyed. Herbarium voucher specimens of *M. gibsonii* (Ivy 1624, 1665 and 1675) collected in this study were deposited in the CMI herbarium (IMI 296387, IMI 296388, IMI 296389) and the National Fungus Collection in Pretoria (PREM 48216, PREM 48217 and PREM 48218).

Isolates of *M. gibsonii* were made from two collections (Ivy, 1624 and 1665) on 2% malt extract agar medium. These cultures are presently maintained at the Oxford Forestry Institute, Oxford, and Plant Protection Research Institute, Stellenbosch.

RESULTS AND DISCUSSION

*M. gibsonii* was found at four sites in three different forest regions (Table 1) along with other needle fungi, including *Lophodermium australis* Dearness, *Cyclaneusma minus* (Butin) DiCosmo, Peredo & Minter, *Sphaeropsis sapinea* (Fr.) Dyko & Sutton, *Pestalotopsis* sp. and *Truncateilla* sp. These fungi are usually saprophytic on dead needles, including those killed by *M. gibsonii*. Some trees on which *M. gibsonii* was found were also affected by insects or other fungi (Table 1) that could mask the presence of *M. gibsonii*.

Symptoms of brown needle disease caused by *M. gibsonii* appear as pale green spots or bands at any point along infected primary or secondary needles, particularly on seedlings and young trees. Bands on needles turn yellow and then a grey-brown colour. Numerous black stromata of *M. gibsonii* form within the stomatal cavities of affected bands and these, depending on their abundance, give a grey or black discoloration to the bands. Broad bands of black stain may also form in affected foliage before tissues are killed. Foliage of the lower crown is usually the most affected due to the more favourable conditions for infection which occur there. Dead foliage usually remains on the tree for many months but can be shed during high wind or heavy rain.

After the formation of black stromata in the stomatal cavities, brush-like tufts of elongate conidia (Fig. 1–4) are formed on the erumpent parts of the stromata. Production of conidia continues during warm damp weather, which also favours germination and infection. During dry weather, conidia are not produced, but the fungus

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1 Oxford Forestry Institute, South Parks Road, Oxford
2 Plant Protection Research Institute, Private Bag X5017, Stellenbosch 7600

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remains dormant in the host tissues (Gibson, 1979). The fungus can survive for long periods in dry needles, but in more temperate climates it might overwinter as latent infections in green needles which become infected late in the year. These latent infections would then give rise to symptoms in the spring of the following year (Suto, 1982).

Shoot and needle blight symptoms have been noted in South Africa on pines, such as *P. radiata*, for many years (Wingfield & Knox-Davies, 1980) with much of this damage reportedly due to *S. sapinea* (syn. *Diplodia pinea* (Desm.) Kickx) infection following severe hail storms. *S. sapinea* has thus been blamed for the abandonment of *P. radiata* planting in the warmer parts of South Africa (Lückhoff, 1964; Laughton, 1937). In addition, dothistroma needle blight caused by *Mycosphaerella pini* E. Rostrup was reported from an unspecified site in the Eastern Cape Forest region in 1965 (Ivory, 1967) and more recently from the same region by Lundquist & Roux (1984). The symptoms of brown needle disease and dothistroma needle blight can be confused with, or masked by, symptoms of *S. sapinea*. For this reason, brown needle disease and dothistroma needle blight might be more common than presently supposed. These diseases could also have contributed to the poor performance of *P. radiata* in Natal and Transvaal.

Evans (1984) noted morphological differences between collections of *M. gibsonii* from Asia and Africa, but considered these to be induced by climate or host factors. Ivory (unpublished) observed similar differences between Asian and African collections of *M. gibsonii*, but also found that the African fungus appears to be less pathogenic to young *P. patula* than strains in India and Nepal.

Of the major pine species grown in South Africa, only *P. radiata* and *P. pineaster* are known to be highly susceptible to *M. gibsonii*. Very little information is available regarding the susceptibility of other species. Suscep-
### TABLE 1 Distribution and hosts of *M. gibsonii* in South Africa

<table>
<thead>
<tr>
<th>Forest region</th>
<th>Collection area</th>
<th>Host</th>
<th>Approximate host age (yrs)</th>
<th>Collection number</th>
<th>Associated insect or disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Southern Cape</td>
<td>Sansveld Forest Research Station</td>
<td><em>P. pinaster</em> Ahl.</td>
<td>5</td>
<td>Ivory 1614</td>
<td>Pine woolly aphid (<em>Pineus pinus</em> Macquart)</td>
</tr>
<tr>
<td>Eastern Cape</td>
<td>Isidenge State Forest</td>
<td><em>P. canariensis</em> C. Smith</td>
<td>25</td>
<td>Ivory 1619</td>
<td>Diptilostroma needle blight</td>
</tr>
<tr>
<td></td>
<td>Nelshoogte State Forest</td>
<td><em>P. radiata</em></td>
<td>5</td>
<td>Ivory 1620</td>
<td>Diptilostroma needle blight</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>P. radiata</em></td>
<td>18</td>
<td>Ivory 1624</td>
<td>None</td>
</tr>
<tr>
<td>Eastern Transvaal</td>
<td>D. R. de Wet Forest Research Station</td>
<td><em>P. canariensis</em></td>
<td>25</td>
<td>Ivory 1665</td>
<td>Diplodia shoot blight (<em>S. sapinea</em>)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>P. griffithii McClelland</em></td>
<td>25</td>
<td>Ivory 1675</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>P. radiata</em></td>
<td>20</td>
<td>Ivory 1677</td>
<td>None</td>
</tr>
</tbody>
</table>

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### REFERENCES


