

The distribution of *Monechma* (Acanthaceae) species in southern Africa

JOAN MUNDAY*

ABSTRACT

The distribution of 19 species of *Monechma* in southern Africa is given and the manner in which their occurrence is related to rainfall is discussed. The possibility of a centre of speciation lying in south-west Namibia/South West Africa is considered.

RÉSUMÉ

LA RÉPARTITION DES ESPÈCES MONECHMA (ACANTHACEAE) EN AFRIQUE AUSTRALE

La répartition des 19 espèces de *Monechma* en Afrique australe est donnée et la manière dont leur présence est liée aux précipitations est discutée. La possibilité d'un centre de spéciation dans le Sud-Ouest de la Namibie/Sud-Ouest Africain est considérée.

INTRODUCTION

The genus *Monechma* Hochst., closely related to *Justicia* L., is an African genus of about 60 species. These species occur in both tropical and sub-tropical regions and one extends as far as India. The genus is represented in southern Africa, i.e. the area covered by the Flora of Southern Africa, which includes South Africa, Botswana and Namibia, by 19 species. Except for one, *M. leucoderme* (Schinz) C.B.Cl., which is regularly found on granite, the local *Monechma* species all show a preference for lime and are most commonly found on substrates containing it. On the whole, *Monechma* plants are well-adapted to survival in a harsh environment, being finely attuned to xerophytic conditions and are tough, hardy plants which occupy a wide variety of habitats in generally arid areas. A rainfall map of southern Africa is provided in Fig. 1.

DISTRIBUTION OF SPECIES

The species may, for convenience, be roughly divided into three groups based on the size of the area which each species occupies. The divisions are quite arbitrary and the distributional areas are only large or small in relation to one other.

1. The two largest species, *Monechma debile* (Forsk.) Nees and *M. divaricatum* (Nees) C.B.Cl., are not endemic in southern Africa. *Monechma debile* is the most widespread species in the entire genus and the only one also having extra-African distribution, occurring as far afield as India. It often appears as a weed or a ruderal and is one of only two annual species in southern Africa. Apart from the extreme north of the Transvaal where the rainfall is between 200-400 mm per annum, *M. debile* is not generally found in areas where the rainfall is less than 400 mm per annum and in this respect it differs markedly from most of the other species. (Fig. 2 & Table 1).



FIG. 1.—Rainfall map of southern Africa based on Jackson's Climatological Atlas of Africa.

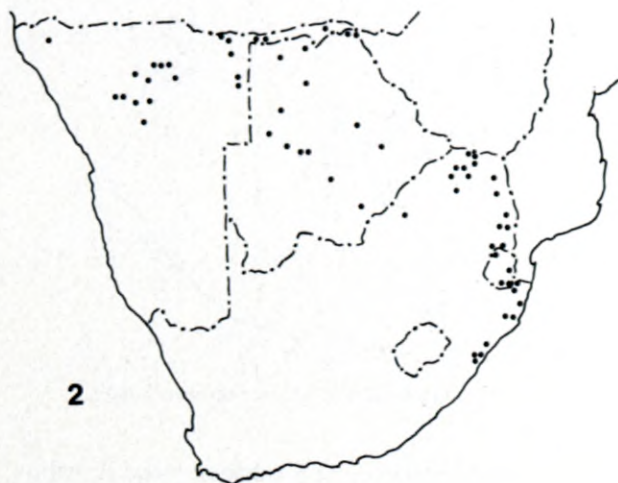


FIG. 2.—Distribution of *Monechma debile*.

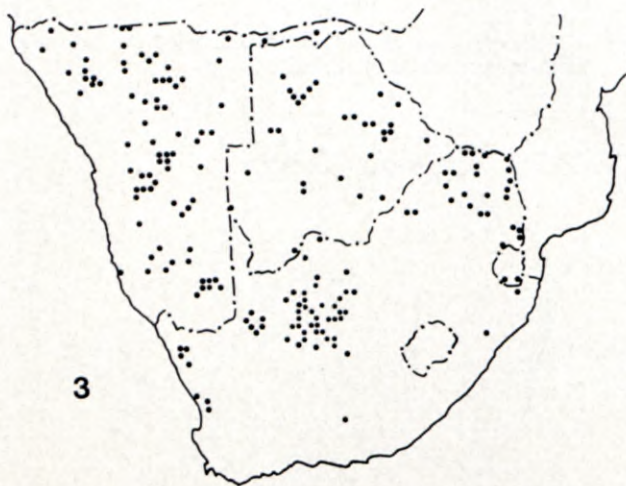
The second species with a wide distribution is *M. divaricatum*, which also occurs beyond the borders of southern Africa. It is not as restricted as *M. debile* within our area, appearing quite generally in the northern Cape and throughout Namibia, though not

* Department of Botany, University of the Witwatersrand, Johannesburg 2001, South Africa.

TABLE 1.—Analysis of species according to rainfall requirements, measured in mm per annum

Species	Under 100	100 and under 200	200 and under 400	400 and over
<i>crassiusculum</i>	×			
<i>callothamnum</i>	×			
<i>mollissimum</i>	×			
<i>saxatile</i>	×			
<i>salsola</i>	×			
<i>calcaratum</i>	×	×		
<i>leucoderme</i>	×	×		
<i>desertorum</i>	×	×		
<i>distichotrichum</i>	×	×	×	
<i>cleomoides</i>	×	×	×	
<i>spartioides</i>	×	×	×	
<i>incanum</i>	×	×	×	
<i>genistifolium</i>	×	×	×	×
<i>divaricatum</i>		×	×	×
<i>serotinum</i>		×		
<i>robustum</i>		×		
<i>grandiflorum</i>		×		
<i>tonsum</i>		×	×	
<i>debile</i>		×	×	
Totals	13	13	8	3

where the rainfall is less than 100 mm per annum, nor is it found in the southern Transvaal, Orange Free State, Lesotho, most of Natal or the southern and eastern Cape (Fig. 3).

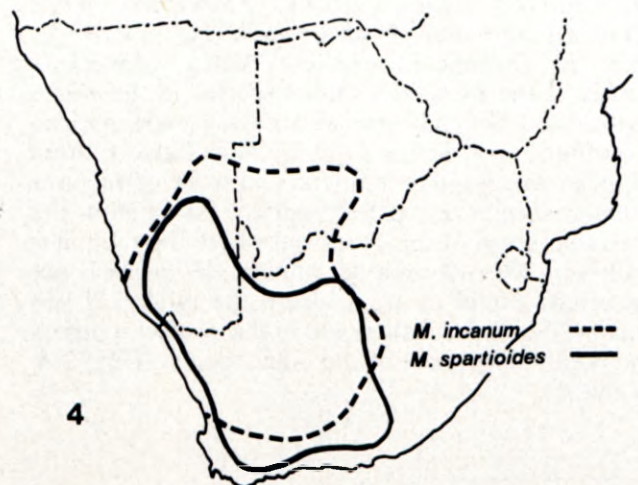
FIG. 3.—Distribution of *Monechma divaricatum*.

2. Seven species, occupying medium-sized distributional areas, are placed in the second group, viz. *M. incanum* (Nees) C.B.Cl., *M. spartioides* (T. Anders.) C.B.Cl., *M. genistifolium* (Engl.) C.B.Cl., *M. cleomoides* (S. Moore) C.B.Cl., *M. distichotrichum* (Lindau) P. G. Meyer, *M. leucoderme* (Schinz) C.B.Cl. and *M. desertorum* (Engl.) C.B.Cl.

Monechma incanum and *M. spartioides* are largely sympatric and, except for isolated instances,

neither species occurs where the rainfall exceeds 400 mm per annum. *M. spartioides* is most heavily concentrated in the Orange River basin, from the Vaal-Orange confluence westward towards the coast and into southern Namibia, whereas *M. incanum* is more generally scattered in its distribution throughout the same area (Fig. 4).

M. genistifolium (in which *M. australe* P. G. Meyer is included as a subspecies) extends in a broad band from north-west to south-east Namibia and into the northern Cape as far as Prieska. The two subspecies occupy different parts of the distributional area, subspecies *genistifolium* being confined to the northern half and subspecies *australe* to the

FIG. 4.—Distribution of *Monechma spartioides* and *M. incanum*.

southern. The bulk of this species is found in the 100–200 mm per annum rainfall belt, but the margins are both above and below these levels (Fig. 5). *M. cleomoides* (as defined here it includes *M. arenicola* Engl.) is difficult to assess, being more of a collection of quite different groups of plants connected only loosely by their indumentum, rather than a clearly defined taxonomic entity and any inferences drawn from the distribution of these plants could therefore be misleading. They all, however, occur in a well-defined band from Angola in the north, down the western half of Namibia to Sandverhaar in the south (Fig. 6).

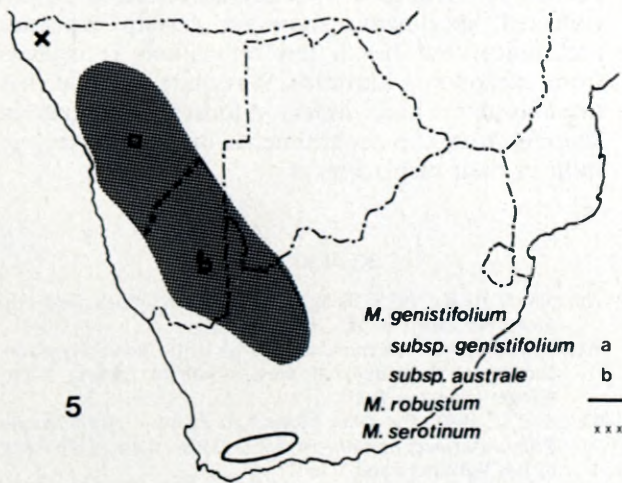


FIG. 5.—Distribution of *Monechma genistifolium* subsp. *genistifolium* and subsp. *australe*, *M. robustum* and *M. serotinum*.



FIG. 6.—Distribution of *Monechma cleomoides*.

The last three species in this group have the most restricted distributions and overlap one other in the south-western corner of Namibia. *M. distichotrichum* extends from Aus in southern Namibia to the Prieska district of the Cape, *M. leucoderme* seems to be confined to mountainous areas and is found from the Orange River northwards as far as Windhoek and *M. desertorum*, as its name implies, occurs mainly in and around the Namib desert from Uis southward to Witpütz and eastwards as far as Holoog. *M. desertorum* is an annual species and occurs only where the rainfall is less than 200 mm

per annum, about half of the recorded specimens having been collected in localities where the rainfall is less than 100 mm per annum. On the other hand, both *M. distichotrichum* and *M. leucoderme* have been collected in three different rainfall belts viz. under 100, 100–200 and 200–400 mm per annum. Contrary to published records (Acocks, 1975; Wilman, 1946), *M. desertorum* does not occur anywhere in South Africa, being restricted to Namibia. Plants from the Cape identified as this species are almost certainly examples of *M. distichotrichum* (Fig. 7).

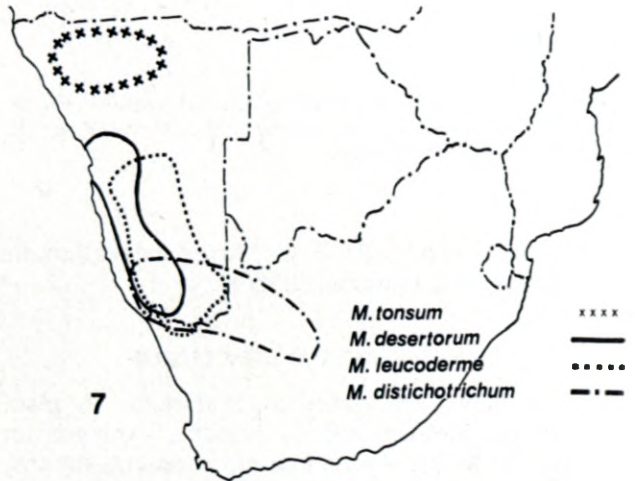


FIG. 7.—Distribution of *Monechma tonsum*, *M. desertorum*, *M. leucoderme* and *M. distichotrichum*.

3. The third group, containing the smallest, most restricted species is probably the most interesting of the three groups as it seems to provide evidence for a centre of speciation, certainly of distribution for the southern African species as a whole. The group comprises 10 species. *M. salsola* (S. Moore) C.B.Cl. is an Angolan species which only just enters the area of the Flora in northern Namibia, where it is found in a few places in Kaokoland. It is also an arid area species, occurring only where the rainfall is less than 100 mm per annum (Fig. 8). Also in the north, between the 100 mm and 200 mm isohyets, is the single locality of *M. serotinum* P. G. Meyer, known only from its type gathering (Fig. 5). Further east, from Ohopoho to the area around Etosha Pan and south to Khorixas (Welwitschia), *M. tonsum* P. G. Meyer is found. The latter does not occur where the rainfall is less than 200 mm per annum, but is also found where precipitation is in excess of 400 mm per annum and may therefore be grouped with the tropical species further north, although its distribution beyond Namibia, if any, is not known (Fig. 7).

With the removal of the three species mentioned above, the remaining taxa may be described as very restricted, endemic, arid-area species. With the exception of *M. robustum* P. Bond, which occurs in the southern Cape, in a small area between Anysberg and Oudtshoorn, all the species occur in the south of Namibia and the Orange River basin (Figs 5 & 8). They are *M. calcaratum* Schinz, *M. callothamnum* J. Munday ms. (Munday, 1980), *M. crassiusculum* P. G. Meyer, *M. grandiflorum* Schinz,

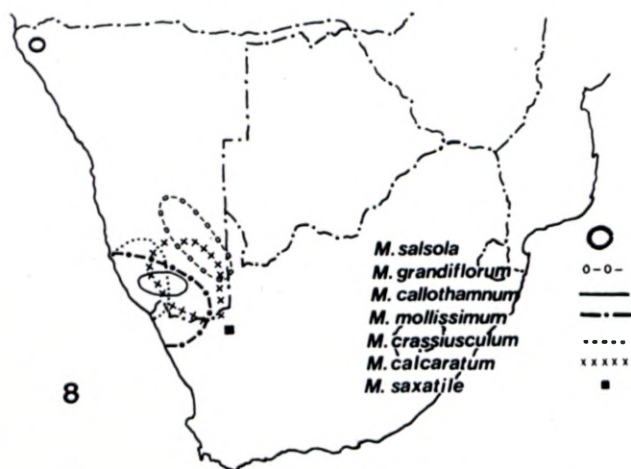


FIG. 8.—Distribution of *Monechma salsola*, *M. grandiflorum*, *M. callothamnium*, *M. mollissimum*, *M. crassiusculum*, *M. calcaratum* and *M. saxatile*.

M. mollissimum (Nees) P. G. Meyer and *M. saxatile* J. Munday ms. (Munday, 1980).

DISCUSSION AND CONCLUSION

In a paper on aridity as a stimulus to plant evolution, Stebbins (1952) presents evidence 'in favour of the hypothesis that environments limiting or deficient in one all important factor, moisture, have often promoted rapid evolution.' The southern half of Namibia, particularly the south-western corner, is a very arid region, and is indeed such an environment. The last six species listed in the third

group above all occur in areas where the rainfall is less than 200 mm per annum and it is tempting to regard this region as the centre of speciation for the southern African species (Fig. 8).

The position of *M. robustum* is problematical. It is not known whether to regard it as a relic species, perhaps pushed to its present position by *M. incanum* or *M. spartioides* or whether it has recently evolved in its present position.

Some *Monechma* species appear to have very definite rainfall requirements whereas others have a much wider tolerance of varying conditions and their distribution is scattered across several rainfall belts (Table 1). Where a species, as reflected by its collected specimens, shows a certain moisture preference, but has a few anomalous recordings from exceptional localities, it is quite possible that these localities have, in fact, a local microclimate in keeping with the requirements of the species, in spite of their displacement.

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