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A note on *Dichrostachys cinerea* in South Africa

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ABSTRACT

The nature of the morphological variation within *Dichrostachys cinerea* (L.) Wight & Arn. in the area delimited for the Flora of Southern Africa is discussed. An attempt is made to evaluate the taxonomic significance of some of the differential characters employed by Brenan & Brummitt in Bol. Soc. Brot., Sér. 2, 39: 61–115 (1965) in order to delimit the infraspecific taxa recorded from our area. Certain modifications to Brenan & Brummitt's treatment are proposed.

INTRODUCTION

Dichrostachys cinerea (L.) Wight & Arn. is an extraordinarily variable and taxonomically complex species, widespread in Africa, Asia and reaching Australia. An analysis of the variation within the species, which resulted in the recognition of a number of infraspecific taxa, was the subject of a very detailed paper by Brenan & Brummitt in Bol. Soc. Brot., Sér. 2, 39: 61–115 (1965). Of the numerous infraspecific taxa recognized by Brenan & Brummitt, the following eight are recorded from the area delimited for the Flora of Southern Africa:

Subsp. *nyassana* (Taub.) Brenan.

Subsp. *africana* Brenan & Brummitt var. *africana*.

Subsp. *africana* Brenan & Brummitt var. *lugardiae* (N.E. Br.) Brenan & Brummitt.

Subsp. *africana* Brenan & Brummitt var. *setulosa* (Welw. ex Oliv.) Brenan & Brummitt.

Subsp. *africana* Brenan & Brummitt var. *pubescens* Brenan & Brummitt.

Subsp. *africana* Brenan & Brummitt var. *plurijuga* Brenan & Brummitt.

Subsp. *argillicola* Brenan & Brummitt var. *hirtipes* Brenan & Brummitt.

Subsp. *forbesii* (Benth.) Brenan & Brummitt.

Some idea of the distribution of these taxa in our area may be gained from Fig. 1.

Decisions have had to be reached for the account of *D. cinerea* being prepared for the Flora of Southern Africa and, unfortunately, I do not find Brenan & Brummitt's treatment of the species in our area altogether acceptable. It seems necessary therefore to give reasons.

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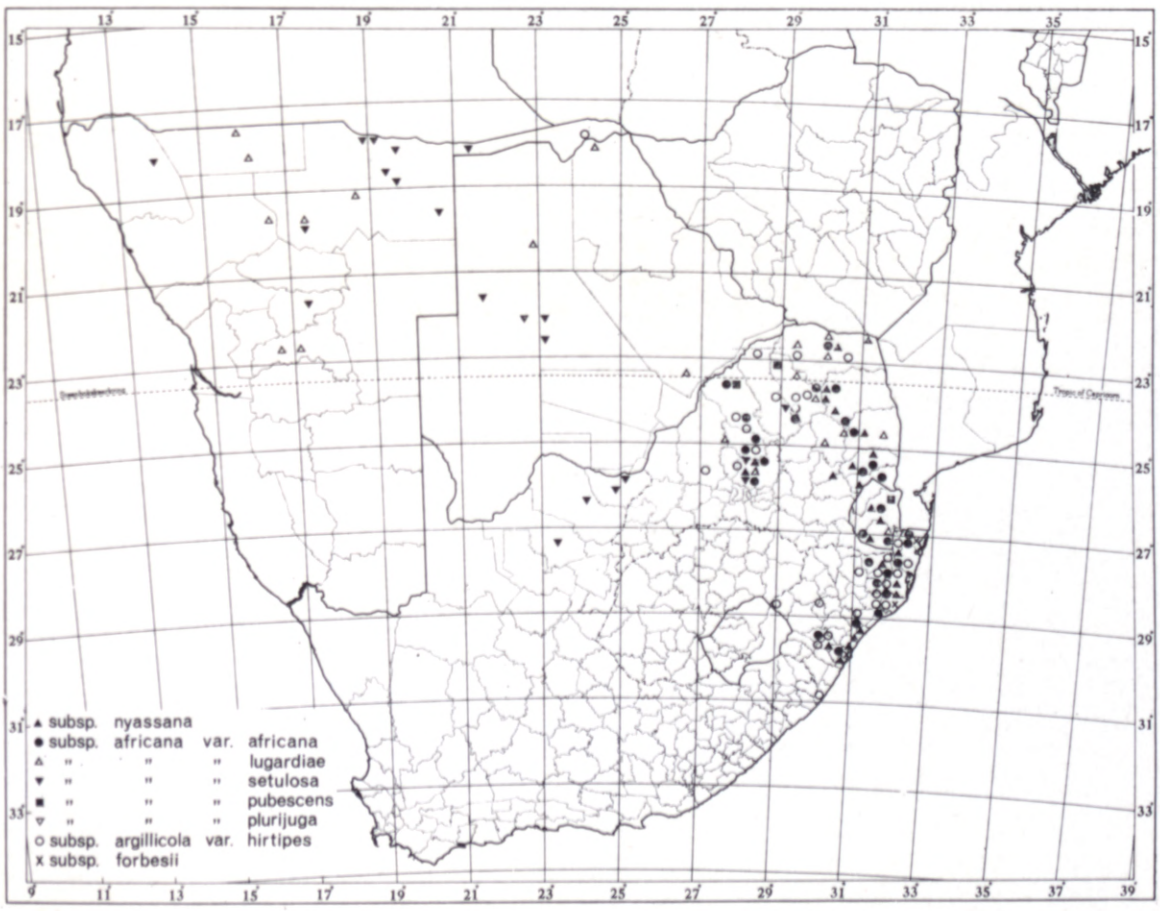

FIG. 1.—The known distribution of the infraspecific variants of *Dichrostachys cinerea* in South Africa.

DISCUSSION

From a study of the abundant material of *D. cinerea* in our area it is at once apparent that there is ± continuous variation throughout, and that the extremes have been delimited and given formal taxonomic status. When extreme, each taxon is usually fairly easily recognizable but, as mentioned by Brenan & Brummitt, there are intermediates between most of the taxa. In view of the numerous intermediates, it is perhaps debatable whether the creation of an elaborate system of infraspecific taxa was entirely desirable. The purpose of this note, however, is to discuss the difficulties encountered in delimiting some of the taxa in our area, to attempt to evaluate the taxonomic significance of some of the differential characters employed by Brenan & Brummitt, and to find an acceptable taxonomic treatment in our area.

In its typical form in tropical Africa, subsp. *nyassana* is distinct and easily recognized by its broad leaflets, large leaves and usually fascicled peduncles. However, in our area leaflet width, leaf size and the arrangement of the peduncles provide no discontinuity between subsp. *nyassana* and subsp. *africana* var. *africana,* and some specimens from the eastern Transvaal, Swaziland and Natal, are extremely difficult to place with certainty. Indeed, it is sometimes a matter of opinion whether they should be assigned to subsp. *nyassana* or to subsp. *africana* var. *africana*. What is particularly disconcerting is that sometimes a specimen is assigned to subsp. *nyassana* because some of the leaflets exceed 2 mm in width, while a duplicate of the same collection may be entirely devoid of leaflets 2 mm or more wide and keys out to subsp. *africana* var. *africana*. The problem of differentiating depauperate specimens of subsp. *nyassana* and robust specimens of subsp. *africana* var. *africana* in our area is a very real and difficult one. All available evidence indicates that there is no clear morphological discontinuity between the two taxa and that the one merely grades into the other. The distributional range of subsp. *nyassana* in our area is very similar to that of subsp. *africana* var. *africana*.

Subsp. *africana* var. *africana**, on the other hand, also grades into subsp. *africana* var. *lugardiae* and into subsp. *argillicola* var. *hirtipes* in our area. In Fl. Zamb. 3, 1: 38 (1970), subsp. *argillicola* var. *hirtipes* was distinguished from subsp. *africana* by having fewer pinnae pairs and narrower pods. In our area, however, specimens with few pinnae pairs which key out to subsp. *argillicola* var. *hirtipes* often have pods up to 1,1 cm wide, so that pod width fails to provide a discontinuity between the two taxa. Although on some specimens of subsp. *argillicola* var. *hirtipes* the pods are loosely coiled, on others the pods are strongly coiled and no distinction can be drawn between them and specimens of subsp. *africana* var. *africana* on the grounds of the degree of coiling of the pods. The number of pinnae pairs likewise provides no discontinuity between the two taxa. On occasions it is found that a specimen keys out to subsp. *argillicola* var. *hirtipes,* while another, with an almost identical facies, keys out to subsp. *africana* var. *africana* because the latter possesses an extra pair of pinnae. The distributional ranges of subsp. *africana* var. *africana* and subsp. *argillicola* var. *hirtipes* in our area are very similar, and there is little evidence that subsp. *argillicola* var. *hirtipes* is characteristic of the heavy clay soils of valleys. Brenan & Brummitt l.c.: 84 (1965) recorded only one specimen of subsp. *africana* var. *africana* from Natal, but from the more abundant South African material available to me, it is clear that this taxon is fairly widespread in Natal.

The more abundant South African material available also reveals that there is continuous variation in leaflet width and other morphological characters between subsp. *africana* var. *africana* and var. *lugardiae*. In var. *africana* there tends to be a stipitate gland on the rhachis at the junction of all the pinnae pairs, while in var. *lugardiae* the glands are usually only at the junction of the lowermost 1–2 pinnae pairs and the uppermost 1–5 pairs, but the number and position of the glands represent an inconsistent tendency. Depauperate specimens of subsp. *africana* var. *africana* tend to be confused with robust specimens of var. *lugardiae* on the one hand, and with robust specimens of subsp. *argillicola* var. *hirtipes* on the other. In our area, at least, subsp. *africana* var. *africana* occupies an intermediate position between subsp. *nyassana,* subsp. *africana* var. *lugardiae* and subsp. *argillicola* var. *hirtipes*.

Subsp. *africana* var. *setulosa* is characterized by having sessile or very shortly (to 0,3 mm) stipitate glands on the rhachis at the junction of each pinnae pair. Var. *setulosa* and var. *lugardiae* have a similar facies and the two taxa are differentiated almost solely on the type of glands on the leaf-rhachis. Both taxa have a prominently western distribution in our area, var. *lugardiae* extending the further east of the two. The sessile glands appear to be a fairly reliable diagnostic character and in general little difficulty has been experienced in referring specimens to this taxon except in the central Transvaal where some specimens appear to grade into var. *lugardiae*. These problematical specimens have a stalked gland at the junction of the lowest pinnae pair and ± sessile glands at the junction of all of the other pinnae pairs. It is perhaps worth recording here that five of the eight taxa encountered in our area have been recorded within a ± ten kilometre radius of Pretoria, namely, subsp. *nyassana*, subsp. *africana* varieties *africana*, *lugardiae*, *setulosa* and subsp. *argillicola* var. *hirtipes*.

Subsp. *africana* var. *pubescens* is very infrequent and irregular in its occurrence in our area. The densely pubescent leaflet surfaces appear to be quite distinctive and enable this taxon to be recognized without difficulty.

Subsp. *forbesii,* which occurs infrequently along the Natal coast in our area, is distinguished from the other subspecies in having subglabrous to densely puberulous peduncles and glabrous to sparsely appressed-puberulous young branchlets. There is some evidence in our area that the degree of pubescence of the peduncles alters with age; the peduncles of flowering specimens on some plants are ± densely pubescent,

* Since Brenan & Brummitt's paper on *Dichrostachys* was published in 1965 important changes affecting autonyms (automatically established names) were introduced into Article 26 of the latest edition of the International Code of Botanical Nomenclature (1972). One of these changes is the rejection in certain circumstances of the previous ruling that autonyms must always be adopted for taxa which include the type of the correct name of the next higher taxon. In some instances this results in a name which was correct when published now being made retrospectively incorrect, and thus enforcing the adoption of another, often undesirable, name. *Dichrostachys cinerea* subsp. *africana* var. *africana* is such an example. Included in this variety was *Cailliea dichrostachys* Guill. & Perr. var. *leptostachys* (DC.) Guill. & Perr., so that the correct name for var. *africana*, which was itself correct under the Code when published, is now var. *leptostachys* under the new Code. This requires a new combination for var. *leptostachys*. However, as an attempt is to be made at the Leningrad Congress in 1975 to have the recent changes in the Code affecting antonyms reversed, it is considered undersirable to effect the new combination until the outcome of this attempt is known.

while the peduncles on fruiting specimens on the same plant are glabrescent. Unfortunately there is only one flowering specimen from our area with subglabrous peduncles. Most of our specimens with ± glabrous peduncles and young branchlets, have a somewhat different facies to the type specimen of subsp. *forbesii*.

CONCLUSIONS

Because of the ± continuous morphological variation within *D. cinerea,* Brenan & Brummitt's treatment of the species in our area is not altogether acceptable. However, as it seems convenient, for example, to distinguish formally those specimens with broad leaflets and large leaves with stalked glands in the eastern Transvaal, Swaziland and Natal from the specimens with narrow leaflets and small leaves with sessile glands in South West Africa, the western Transvaal and northern Cape, it is felt that some infraspecific taxa within *D. cinerea* should be recognized. Since it is not considered desirable to accept Brenan & Brummitt's treatment in its entirety, certain modifications to it are proposed.

The modifications proposed below are regarded as provisional until the species has been thoroughly investigated in the field in an attempt to analyse the patterns of variation and to assess the taxonomic significance of the differential characters. At this stage I am not convinced that an elaborate infraspecific hierarchial system is necessarily the best way to display or explain the patterns of variation, or that the variation patterns within this complex species can necessarily be successfully analysed. We appear to be dealing with an aggregate of ecotypes with minor morphological distinctions and in some areas of distribution each population has its own characteristic "look". As no taxon in our area appears to be really more distinct, and therefore of greater taxonomic significance than any other, it is felt that they should all have the same taxonomic rank. However, as the proposed modifications are regarded as provisional, new combinations have been avoided.

Although there is no distinct morphological discontinuity between subsp. *nyassana* and subsp. *africana* var. *africana* in our area, it is proposed to continue to uphold subsp. *nyassana* for those plants with leaflets 2 mm or more wide. To maintain subsp. *nyassana* will, of course, create certain difficulties and it will be largely a matter of opinion whether some specimens should be referred to subsp. *nyassana* or to subsp. *africana* var. *africana*. However, in reaching this decision I have been influenced by the fact that over most of its range subsp. *nyassana* appears to be a ± distinct taxon. There is some evidence to suggest that subsp. *nyassana* has slightly different ecological preferences in certain areas, but field studies are required to substantiate this. It would be interesting to collect specimens over a period of years from certain selected plants which are ± intermediate between subsp. *nyassana* and subsp. *africana* var. *africana* to establish whether the maximum leaflet width and leaflet size is fairly uniform or whether maximum leaflet width fluctuates above and below 2 mm over the years depending upon climatic conditions. Perhaps the present limits between subsp. *nyassana* and subsp. *africana* var. *africana* need to be re-defined slightly.

As the abundant South African material reveals that there is ± continuous morphological variation between subsp. *africana* var. *africana* and var. *lugardiae,* it is felt that little is to be gained by continuing to recognize both taxa. Consequently var. *lugardiae* is relegated to synonymy within var. *africana*. The lack of any well-defined morphological, geographical or ecological discontinuities between subsp. *africana* var. *africana* and the specimens which key out to subsp. *argillicola* var. *hirtipes* persuades me to include the latter under subsp. *africana* var. *africana*. The range of morphological variation covered by the plants included in var. *africana* in its original sense, was considerable, so that the inclusion in var. *africana* of specimens previously referred to var. *lugardiae* and to subsp. *argillicola* var. *hirtipes* scarcely increases the overall range of variation. The limits of subsp. *africana* var. *africana* in our area are therefore enlarged and it becomes the most widespread and predominant taxon encountered. Var. *setulosa* appears to be a ± distinct taxon with a fairly well defined distribution and is therefore considered worthy of retention. Var. *pubescens* is likewise upheld.

Two specimens collected near Ndumu in northern Tongaland on the border of Mozambique, namely, *Strey & Moll* 4014, 4020, fall within the limits of subsp. *africana* var. *plurijuga*. These specimens have slightly narrower leaflets and a few more pinnae pairs than is usual in var. *africana* but, until more information is available, it is intended to include these specimens in var. *africana*.

Subsp. *forbesii* is infrequent in its occurrence along the Natal coast. In the absence of a good selection of flowering specimens with ± glabrous peduncles it is difficult to assess the taxonomic significance of this character. Sparsely appressed-puberulous young branchlets are found in specimens of subsp. *africana* var. *africana* in Zululand which have densely pubescent peduncles. Detailed field studies are required to establish whether the plants with ± glabrous peduncles have distinct ecological preferences or whether they are merely variants within populations with predominantly pubescent peduncles. Useful information would result from collecting specimens over a period of years from selected plants with ± glabrous penduncles to establish whether any variation in the degree of pubescence of the peduncles on a plant is recorded. For the present those specimens with ± glabrous peduncles are included in either subsp. *nyassana* or in subsp. *africana* var. *africana*.

It seems opportune to consider the identity of *Acacia spinosa* E. Mey., Comm. 170 (1836), which was based on a specimen collected by Drège at Port Natal. Oliv. in Fl. Trop. Afr. 2: 333 (1871) and Benth. in Trans. Linn. Soc. Lond. 30: 382 (1875) cited *A. spinosa* as a synonym of *Dichrostachys nutans* (Pers.) Benth., the latter now being regarded as a synonym of *D. cinerea* subsp. *africana* var. *africana*. Brenan & Brummitt l.c. 115 (1965) mention not having seen a type specimen of *A. spinosa* so it was of great interest to find an isotype in the Paris Herbarium. The specimen consists of a sterile twig with a yellowish-brown stem and spines. The leaf-rhachides are up to 1,8 cm long, pubescent, and have a stalked gland up to 1 mm high at the junction of each of the 4–5 pinnae pairs, the rhachillae are up to 3,8 cm long, and the leaflets are up to 5,5 × 1,25 mm, glabrous above, with sparsely ciliolate margins and scarcely visible lateral veins beneath. The lack of flowers or fruits is unfortunate but the specimen confirms the earlier decisions to treat *A. spinosa* as a synonym of *D. nutans*.

D. caffra Meisn. ex Benth. in Hook., J. Bot. 4: 354 (1841) is a *nomen nudum* which, according to Bentham l.c., was based on *Krauss* 166. I have not seen a specimen but Sonder in Fl. Cap. 2: 278 (1862) and Bentham in Trans. Linn. Soc. Lond. 30: 382 (1875) regarded *D. caffra* as a synonym of *D. nutans,* and there is no reason to doubt their decisions.

When using the following key, the width of the largest leaflets must be used; if any leaflets are 2 mm or more wide, the specimen should be referred to subsp. *nyassana*. It is likely that most specimens can be correctly placed, but intermediates occur between most of the taxa, and these may cause difficulty. In particular, it may be difficult to decide whether some specimens should be assigned to subsp. *nyassana* or to subsp. *africana* var. *africana*.

Until the species has been thoroughly investigated in the field and an attempt made to analyse the patterns of variation, this more conservative treatment is preferred to the one adopted by Brenan & Brummitt.

Leaflets some or all 2 mm or more wide; leaves often large and up to 18 cm long, with pinnae up to 7,5 cm long; peduncles usually fascicled.....subsp. *nyassana*

All leaflets less than 2 mm wide; leaves smaller than above, pinnae usually less than 4 cm long; peduncles single or sometimes fascicled:

Surfaces of leaflets (apart from the ciliate margins) glabrous or sometimes with few hairs on the lower surface only:

Glands on leaf-rhachis stipitate or columnar, 0,5–2 mm tall, present at the junction of each pinna pair or absent from some (very rarely the gland between the lowest pinna pair stipitate and glands between the remainder ± sessile); leaflets 0,6–1,75 (2) mm wide.....subsp. *africana* var. *africana*

Glands on leaf-rhachis sessile or very shortly (to 0,3 mm) stipitate, present at junction of all pairs of pinnae; leaflets 0,5–0,8 mm wide.....subsp. *africana* var. *setulosa*

Both surfaces of leaflets densely pubescent.....subsp. *africana* var. *pubescens*