

A TAXONOMIC STUDY OF THE GENUS *XIMENIA* IN NAMIBIA

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ABSTRACT

The genus *Ximenia*, with two species occurring in Namibia, was the subject of a taxonomic study at the National Herbarium of Namibia. Recent taxonomic revisions elsewhere have delimited two new varieties for Namibia. Existing descriptions and keys for *Ximenia* in Namibia were therefore reviewed and updated.

The results were that an updated and comprehensive literature dossier on the genus in Namibia was compiled, and the Namibian taxa within the genus *Ximenia* were documented and a key was compiled.

INTRODUCTION

The genus *Ximenia* L. (family Olacaceae) is composed of eight species of thorny shrubs and trees. Six of the species (*X. coriacea* Engler, *X. horrida* Urban & Ekman, *X. intermedia* (Chodat & Hassler) DeFiliippo, *X. parviflora* Benth, *X. pubescens* Standley and *X. roigii* Leon.) occur throughout Africa and two species (*X. americana* L. and *X. caffra* Sond.) are found in Namibia (Craven, 1999). The botanical name *Ximenia* was derived from a Spanish monk, Francisco Ximenez, who wrote about plants of Mexico in the 17th century (Craven, 1989). This genus was first described by Linnaeus in *Species Plantarum* in 1753. Since then it has been recorded in a number of Floras such as *Prodromus einer Flora van Südwestafrika* (1967), *Flora de Mozambique* (1979), *Flora of Tropical East Africa* (1968) and *Flora Zambesiaca* (1963).

It was confirmed that the two species occurring in Namibia are facultative hemiparasites (DeFiliippo, 1969) which may live on the roots of available host plants growing nearby, as well as autoparasites that attach to non-living objects like stone and plastic.

This plant is of economic importance, having both nutritional and medicinal value. The leaves can be dried and crushed to make powder to break fever. They are also used as a substitute for spinach and eaten by animals such as giraffe. An infusion made from the root is used as remedy for dysentery and diarrhoea and abdominal pain, mental illness, fever and bilharzia. Powder is also applied to sores. The fruits are eaten raw and seeds are crushed for extraction of the oil, which is mixed with red ochre for cosmetic use on skin and hair. Roasted and pounded seeds are used for wounds (Rodin, 1985; Leger, 1997).

MATERIALS AND METHODS

A literature survey was undertaken. All the *Ximenia* specimens in the National Herbarium of Namibia were studied. Different morphological characters were looked at (Radford, 1974; Samuel, 1937) and compared and data analysed for characters of leaves, inflorescence, bark, peduncle, sepals and fruit. Tables with different characters were drawn up. Approximately 25-30 specimens were used. Flowers were soaked in "Windowleen" for 10-15 minutes, dissected and compared. To account for intra-specific variation 5-10 specimens of each species (depending on the available specimens with flowers) were included. These characters were studied under a microscope. Drawings of flowering branches and flowers were made from the specimens and dissected flowers.

Label data from each specimen were loaded on the specialised computer programme called the Specimen Database, and maps were drawn. The specimens, which were incorrectly identified, were redetermined.

The key was constructed based on the specimens studied. It was tested in the National Herbarium in order to determine applicability and appears to work well for distinguishing the four Namibian taxa.

TAXONOMY

Ximenia L.

- a. Branches and leaves glabrous or glaucous. Leaves folded along the canaliculate midrib. Flowers borne on pedunculate cymes or umbels, sometimes solitary. Sepals and pedicels glabrous..... *X. americana*
 - b. Branches and leaves villous or coriaceous. Flowers pedicellate in fascicles or solitary, appear in clusters on lateral shoots. Sepals and pedicels villous or tomentose*X. caffra*
1. *Ximenia americana* L., Sp. Pl. : 1193 (1753)
- a. Leaves glabrous but not glaucous; lamina (20-)30-40 (-50) x (10-)15-20(-30) mm; apex retuse with mucro. Inflorescence umbel, cyme. Pedicel ebracteate, calyx ciliate.....*var. americana*

- b. Leaves small, glabrous and glaucous; lamina (15-)20-25 (-35) x (6-)12-15(-20) mm, usually folded along the midrib; apex retuse with or without mucro. Inflorescence umbel or solitary cyme. Pedicel bracteate near the middle.....var. *microphylla*

1.1 *Ximenia americana* L. var. *americana*

Type: Tropical America, Hort. Cliff. 483 (BM, lecto)

Previous illustrations: Garcia: 33 (1963); Lucas: 4 (1968)

Diagnostic features

Leaves and branches glabrous. Inflorescence cyme or umbel. Pedicels ebracteate. Sepals ciliate. Flowers pedunculate.

Flowering

Plants flower throughout the year, according to the specimens in the herbarium. The literature described the flowering season from September to December (Berry, 1974).

Distribution and habitat preference

This variety occurs in the northern regions of Namibia, mostly the Omusati, Ohangwena, Erongo and Okavango Regions. The plants have no preference for a specific habitat, but can grow in a wide range of habitats.

1.2 *Ximenia americana* L. var. *microphylla* Welw. ex Oliv.

Type: Angola, Welwitsch 1127 (K, holo)

Previous illustration: Craven: 111 (1989)

Diagnostic features

Small glabrous and glaucous leaves which are usually folded along the midrib. Cyme sometimes one-flowered, bracteate near the middle. Pedicel bracteate where it joins the peduncle. Sepals eciliate. Style sometimes absent to/or 0,5 mm.

Flowering

Flowering occurs throughout the year according to the specimens in the herbarium.

Distribution and habitat preference

This taxon has a wide range of distribution in the northern regions of Namibia, where it often overlaps with the other varieties. It is found in various habitats and latitudes, but mostly in soft loamy sand, and deep sands.

2. *Ximenia caffra* Sond.

- a. Young branches and leaves villous or tomentose, leaves conspicuously dark to shiny green adaxially. Sepals and pedicel villous or tomentose.....var. *caffra*
- b. Young branches and leaves glabrous but coriaceous, leaves dull brown to green. Petiole villous in adaxial groove var. *natalensis*

2.1 *Ximenia caffra* Sond. var. *caffra*

Type: SA Transvaal, Magaliesberg, Zeyher 1847 (K, iso)

Previous illustrations: Garcia: 33 (1963); Lucas: 4 (1968)

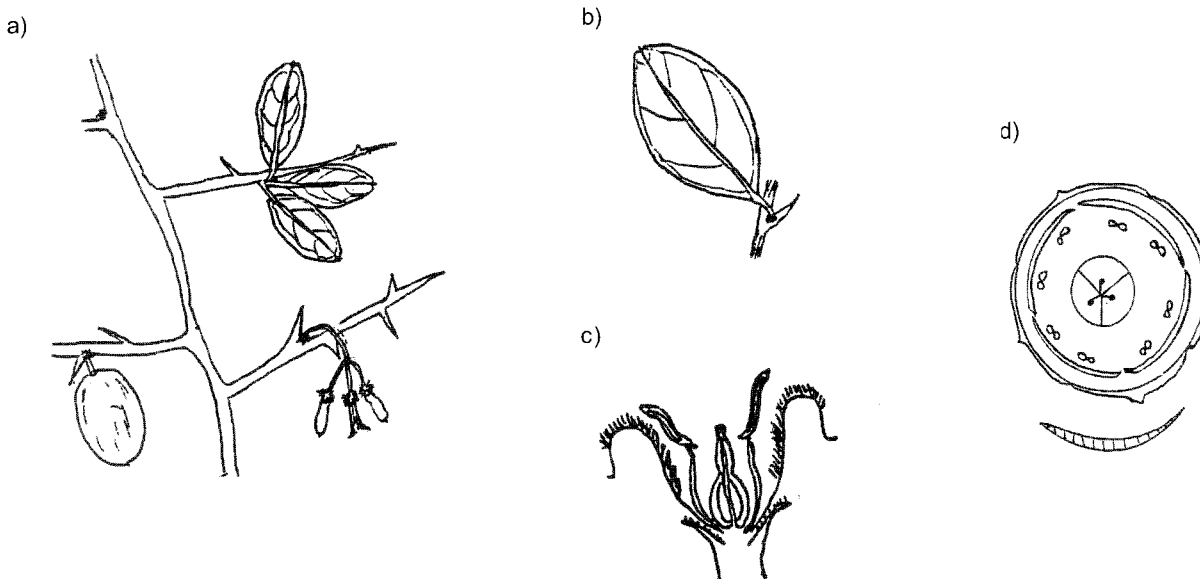


Figure 1. *Ximenia americana* var. *americana*: a) flowering branch, b) leaf adaxial view, c) vertical section of the flower, x10, d) floral diagram (all four varieties have similar floral arrangement).

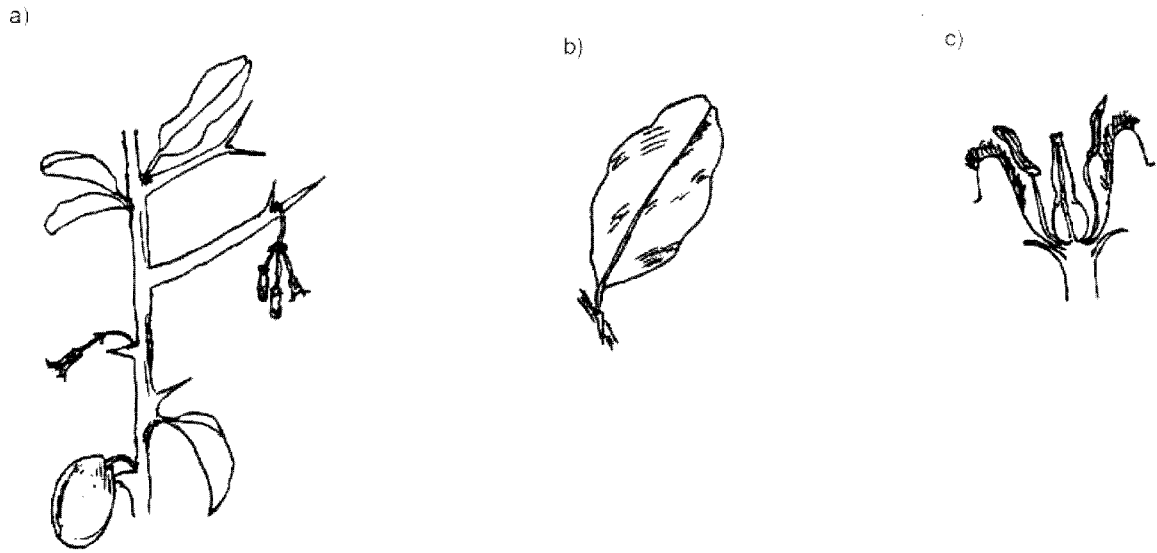


Figure 2. *Ximenia americana* var. *microphylla*: a) flowering branched, b) leaf, adaxial view, c) vertical section of the flower.

Diagnostic features

Leaves and branches villous to tomentose. Inflorescence with pedicellate flowers in umbels. Sepals and pedicel villous.

Flowering

The flowering period is recorded in the literature as from September to March (Garcia, 1963). According to herbarium specimens, this taxon flowers throughout the year in Namibia.

Distribution and habitat preference

Plants are distributed all over the northern regions where the rainfall is higher.

2.2 *Ximenia caffra* var. *natalensis* Sond.

Type: SA, Natal, Durban (Port Natal), Gueinzus 79 (MEL, holo)

Diagnostic features

Petiole with hair in the adaxial channel. Leaves coriaceous. Flowers with long pedicels.

Flowering

No specimens of this variety had flowers and therefore it was not possible to determine the phenology.

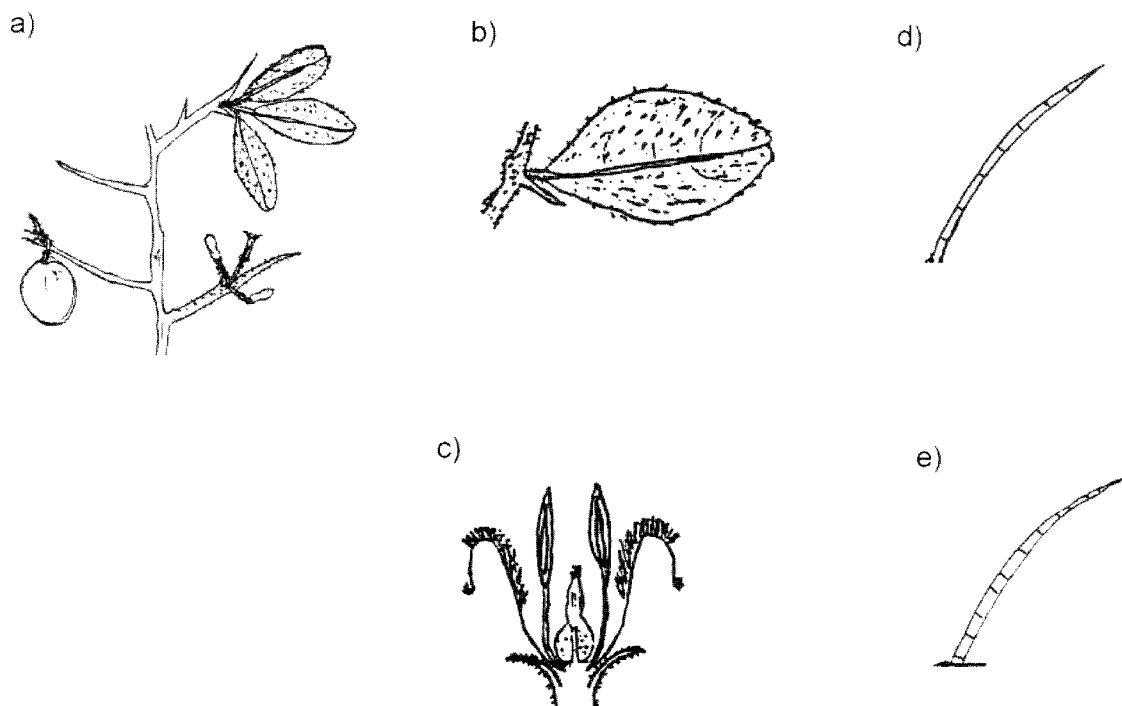


Figure 3. *Ximenia caffra* var. *caffra*: a) flowering branch, b) leaf, adaxial view, c) vertical section of the flower, x10, d) hair type hirsute adaxial e) hair type hirsute abaxial.

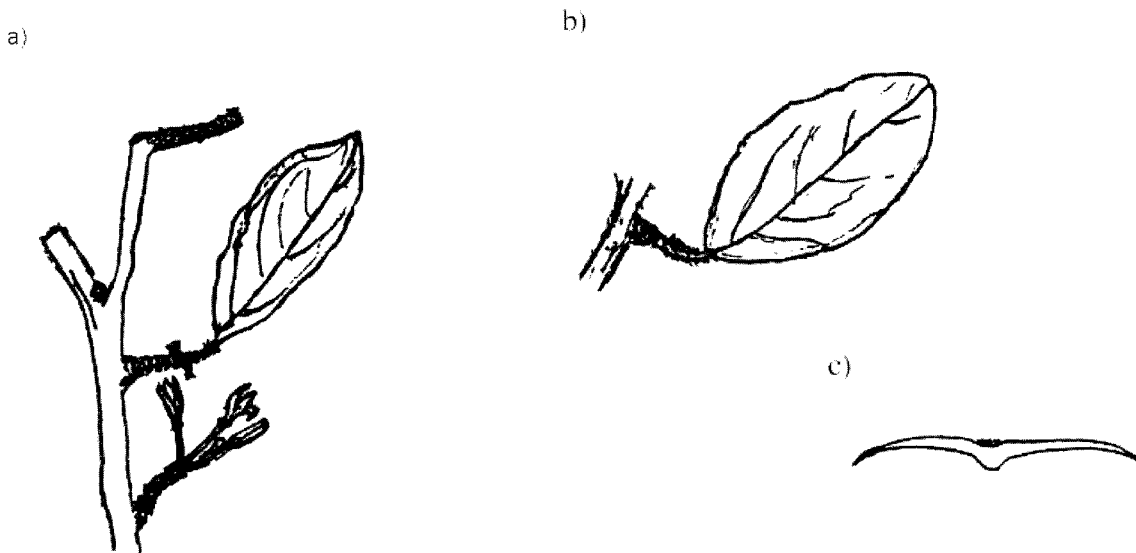


Figure 4. *Ximenia caffra* var. *natalensis*: a) flowering branch, b) leaf, adaxial view, c) cross section of the leaf, x10.

Distribution and habitat preference

This taxon is widespread in the Oshikoto, Ohangwena, Kunene, Okavango and Erongo Regions. It generally prefers woodland, bushland and grasslands and grows in soft soils and also in stony areas.

DISCUSSION

The aim of the study was to make a clear distinction between the species of *Ximenia* in Namibia. The taxa are described in various articles, but these descriptions for Namibian taxa were not compiled in a single, user-friendly publication. The study was aimed to eliminate confusion among the taxa, because

some authors regard them as synonyms of each other, e.g. *X. americana* var. *microphylla* = *X. americana* var. *americana* (Lucas, 1968).

There was no fieldwork done to see the plants in their natural habitat and to collect fresh specimens. Therefore, only specimens in the herbarium were used in this study. The problem found during the study was that *X. caffra* var. *natalensis* was under-collected and, due to the lack of fertile material, only the leaves were studied. A clear difference could be seen in the leaves of all the taxa studied. Further differences were observed, such as that *X. caffra* var. *natalensis* have fewer spines and longer pedicels than *X. caffra* var. *caffra*, which verified findings in the literature. (Milne-Redhead, 1936).

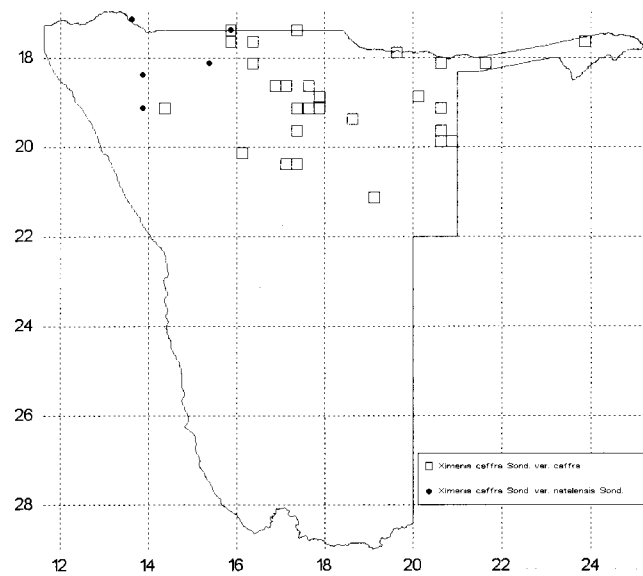
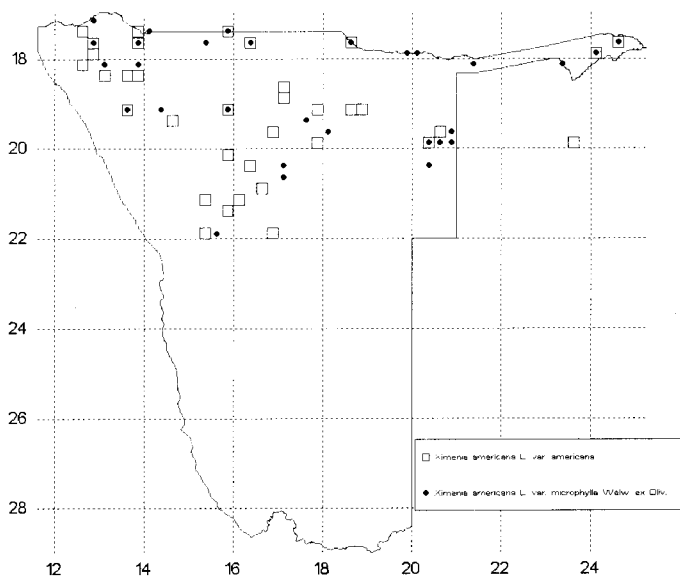


Figure 5 and 6. The geographical distribution of the four varieties of *Ximenia* in Namibia.

It is clear from the maps that distributions of the different taxa overlap and therefore varieties, and not subspecies, exist. There is a limitation in the range of *X. caffra* var. *natalensis* while var. *caffra* occurs over a vast area (Figure 5 and 6).

With this study, gaps have been identified for future collection efforts especially for *Ximenia caffra* var. *natalensis*.

CONCLUSION

This work is an ongoing study and will be continued as new specimens are accessioned from various collectors. The findings of this study will facilitate identification of material, which will minimise incorrect determination, as has happened in the past.

Current research projects being implemented by the institute will also benefit from the results of this study. A better understanding of the taxon delimitation will benefit the "Tree Atlas Project", which aims to map all tree and shrub species in Namibia, as well as the "Useful Plants Project". Given the documented uses for medicine, food and cosmetics, *Ximenia* in Namibia has an untapped potential for future development

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and has been prioritised by the NBRI for further investigation. Baseline studies of this type are essential prior to meeting national objectives of development and food-security.

Skills in taxonomic research have been enhanced through this particular study. New techniques and methodologies learnt, will be applied to other taxa as the author continues her duties at the National Herbarium. This has been a capacity-building exercise to ensure that Namibia's expertise in plant taxonomy will continue well into the new millennium.

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