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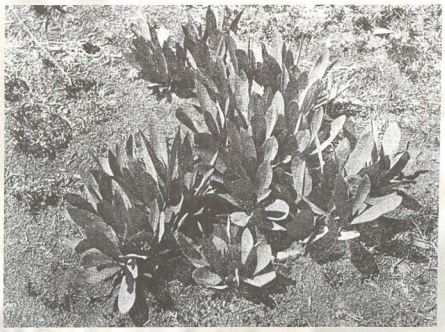
Dichapetalum cymosum (POISON-LEAF/GIFBLAAR): A NEVER-ENDING PROBLEM

Gifblaar plant

INTRODUCTION

Dichapetalum cymosum, known as poison-leaf in English (Ed.'s note: according to the Afr./Eng. Bilingual Dictionary by Bosman et al. 1988) but more commonly referred to by its Afrikaans common name, *gifblaar* or *magou*, is an extremely poisonous plant that kills livestock. In Namibia, gifblaar occurs to the east and north-east of the country and is confined mainly to the fine sandy soils of the Kalahari geological system underlain with Karoo basalt (Opperman & La Grange 1969). According to Correia & Van Rensburg (2000), the general ecological characteristics of the distribution area of gifblaar are soils that are sandy, well-drained and deficient in nutrients. Gifblaar grows in association with trees such as various *Combretum collinum* (*C. mechowianum* O. Hoffm.), *Burkea africana* and *Terminalia sericea* (Du Plooy 1972; Van Vuuren 1960).



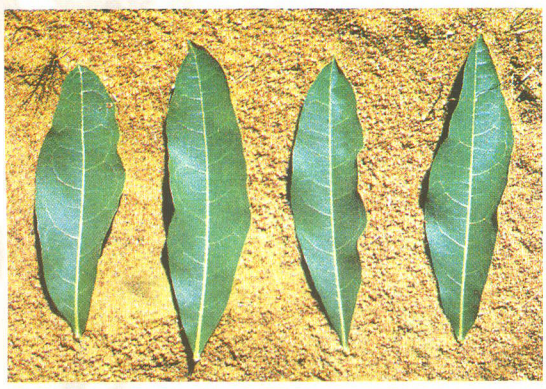
Cluster of gifblaar leaves

LITERATURE REVIEW

The first recording of gifblaar poisoning was in 1890, although research on it only commenced in 1910 (SWAA 1961). Steyn's (1928) study and description of the symptoms of gifblaar poisoning – its toxicology – were complemented by Leemann's (1935) work on the anatomy, morphology and physiology of the plant. Nearly a decade later, Marais (1943) isolated and synthesised monofluoroacetate as the active toxic compound in the plant. This breakthrough enabled further research on the plant's toxicology and pharmacology. Nonetheless, by the 1960s, the vagueness in the literature regarding the treatment of poisoned animals was being lamented (SWAA 1961). And despite further research, Remington's (1935) despair that "the hope of finding any specific prophylactic or curative substance (antidote) for use in gifblaar poisoning has become very remote" remains true today.

STATE INTERVENTION TO CURB STOCK MORTALITIES DUE TO GIFBLAAR

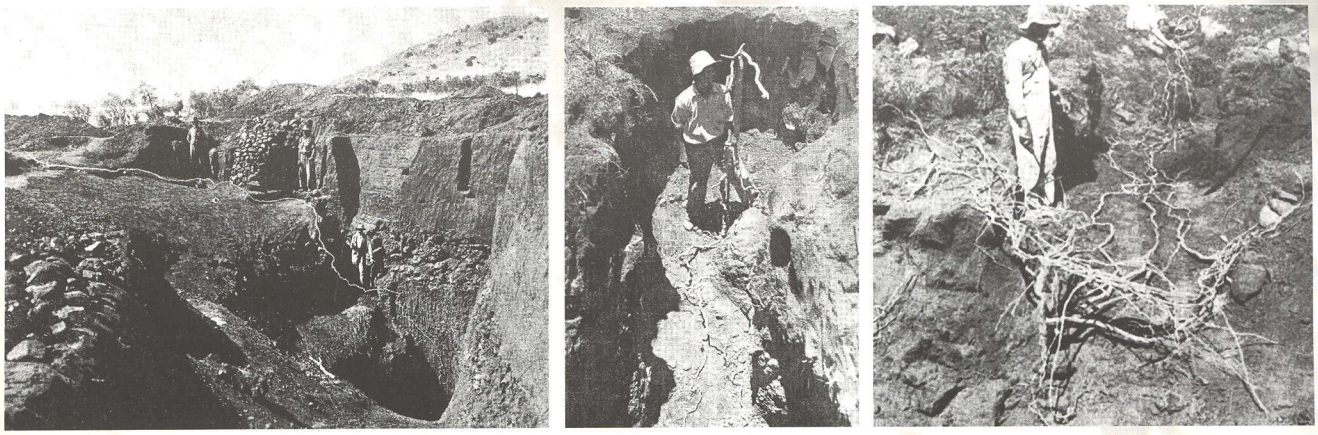
During the 1960s, the farmers in the Grootfontein District approached the South West Africa Administration (SWAA) for assistance regarding livestock deaths due to gifblaar poisoning. An extension officer in Grootfontein, LF la Grange and an Administration botanist, DRJ van Vuuren, were appointed to investigate the issue of livestock mortality in gifblaar-infested areas and compiled a report on gifblaar poisoning and livestock mortality (Van Vuuren 1960). During 1961 the "Gifkommissie" (Department of Agricultural Technical Services in South Africa) were also tasked to investigate the issue of livestock mortality due to gifblaar poisoning in the Grootfontein District. The SWAA then purchased property in the District for the sole purpose of establishing the Sonop Research Station to conduct research on gifblaar. Two projects were launched by the livestock researcher, PAJ Brand, and the pasture researcher, DPJ Opperman. The objectives of these two projects were (a) to determine the possibility of management systems and lick supplementation to alleviate livestock mortality, and (b) to eradicate gifblaar wherever it grew. Eradication was effected by the foliar application of herbicides, or by digging the plants open and treating their stems with herbicides.



Gifblaar leaves, showing the characteristic arches made by the veins

CHARACTERISTICS OF GIFBLAAR

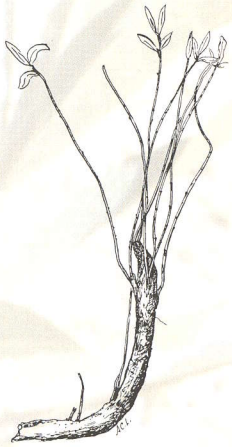
Leemann (1935) provides an in-depth description of the anatomical and morphological properties of the plant, which are of interest not only from a botanical point of view, but also insofar as its eradication is concerned. A typical gifblaar plant has a main stem that penetrates the soil vertically. From this main stem, further sets of stems and branches proliferate horizontally just below soil level. Here and there, the branches produce tufts of leaves above ground. These are the leaves that stock graze on.



Damaged plant sprouting

The underground branching of the stem may continue for many metres, forming an extensive network of horizontal and vertical stems far away from the main stem. This underground network may look like the plant's roots system, but anatomically, it is the plant's stem. From a botanical point of view, gifblaar is a climber that has gone underground. The plant retains the characteristics of climbing plants – but below ground, where it "takes every opportunity to twist and climb" (SWAA 1961).

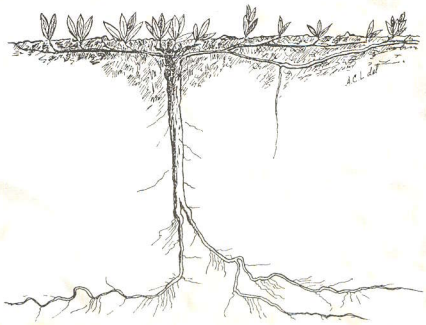
A few other plants that occur in the same habitat as gifblaar are very similar in their growth habits, in that they also have well-developed underground stems and sprout intermittent clumps of leaves above ground. The leaves of these plants are also practically identical to those of the gifblaar plant, and can easily be confused with it. In this regard, in Namibia *Ochna pulchra* is probably the most likely candidate. However, a unique differentiating anatomical feature of the gifblaar plant's leaves is its peculiar venation: the main veins are arched.



Extensive stem system of the gifblaar plant

In 1935, the Veterinary Services Division in South Africa conducted feeding trials in order to determine the exact stage in the plant growth's cycle when the toxicity was at its highest. They established that this occurred in spring, when the plant produced new shoots, and in autumn, when it formed new leaves (Leemann 1935). Thus, the concentration of monofluoroacetate is highest when the plant sprouts. It is obvious, therefore, that climatic conditions play a role in determining when and for how long the plant is toxic enough to kill livestock. Even as it matures, although the concentration of acid decreases, the plant never ceases to be toxic (ibid.). Moreover, further research (SWAA 1961) found that all parts of the plant contained the toxin.

A feature of gifblaar that is of utmost importance in its control is the plant's ability to sprout where stems have been damaged or, even worse, to propagate itself by setting roots and forming a new plant from cuttings of the stem that may remain in the soil after eradication (Leemann 1935). Another feature in relation to the absorption of herbicide is the high proportion of stems below ground, compared with the fewer number of leaves above ground level.



Main underground stem, with leaves growing above ground

DISCUSSION AND CONCLUSION

From the above it is clear that, despite the volume of research on gifblaar, the plant remains a problem in respect of livestock mortalities. Since finding an antidote to gifblaar poisoning seems remote, there is an urgent need for research to find a way to successfully eradicate the plant or at least devise measures to reduce the livestock deaths it causes.

Farmers today continue to request information on gifblaar poisoning. The next three issues of *Spotlight on Agriculture* (No.'s 91, 92 and 93) will attempt to address this need. The two issues review the research conducted in Namibia and South Africa in respect of eradicating gifblaar and devising possible measures to reduce the animal death toll.

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