DEPARTMENT OF AGRICULTURE, SOUTH AUSTRALIA

Agronomy Branch Report

THE DISTRIBUTION AND WEEDINESS OF AFRICAN DAISY (Senecio pterophorus) IN SOUTH AFRICA

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Report No. 37

Aspects of the Distribution and Weediness of African Daisy (*Senecio pterophorus*) With Special Reference to its Inclusion in a Biological Control Programme Proposed for the Rhodes University at Grahamstown - Republic of South Africa.

A.F. Tideman.

FOREWORD

This Agronomy Branch Report records information I gathered during two weeks in South Africa during April, 1970 while on overseas study leave made possible by funds from the Commonwealth Extension Service Grant.

During my visit I spent three days in the Eastern Cape Agricultural Region examining African daisy (Senecio pterophorus) in the field, to assess its behaviour in its natural environment and compare the plant with the South Australian "weed" as we know it. I also aimed to investigate its distribution in relation to climate and in relation to the feasibility of studying its biological control from a research unit based at Grahamstown. This unit was proposed by Dr. R.H. Hughes in 1961, to examine the possibility of gaining biological control of other serious weeds of southern Australia which had South African origins.

I am indebted to many officers in the South African Department of Agriculture Technical Services who planned my visit; particularly to Messrs. Rietman (Public Relations Officer, Department of Agriculture, Queenstown) and Vosloo (Weed Control Officer, Queenstown), who so ably guided me to the many sites we visited and to Mr. Du Toit (Officer-in-Charge, Dohne Research Institute), whose technical knowledge and kind hospitality made my short stay so profitable and enjoyable.

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I. INTRODUCTION:

Ten years ago the Division of Entomology, C.S.I.R.O., considered whether an overseas station should be established in South African in order to study the biological control of major weeds of southern Australia which had South African origin, e.g. Soursob (Oxalis pes-caprae), African boxthorn (Lycium ferocissimum) and the Cape tulips (Homeria breyniana and H. miniata). Other "minor" weeds, including Cape weed (Arctotheca calendula), were also included.

Dr. R.H. Hughes conducted a feasibility study between July and September, 1961 and he recommended that the programme should proceed and that a unit should be based at the Rhodes University at Grahamstown.

Mr. H. Lower in 1962, conducted investigations into the possibility of gaining biological control of soursob. He worked for a year throughout wide areas of South Africa and reported that the possibilities were very remote.

In 1965 the Standing Committee on Agriculture called a conference to discuss the whole issue again. The Conference recommended that the project should go ahead, and for the first time, African daisy (S. pterophorus) was included in the weeds listed for investigation, although no South African field investigation had been made.

Because finance was not available and the skeleton weed investigations in Europe were given higher priority, C.S.I.R.O. has not been able to initiate the work.

My task was to investigate the distribution of African daisy in South Africa in relation to climate, to assess its weediness and general behaviour and to determine the feasibility of including this weed in any biological control studies as recommended by Hughes which may become possible when finance is available.

II. THE DISTRIBUTION OF AFRICAN DAISY (S. pterophorus) IN SOUTH AFRICA:

The natural environment of African daisy is centred in Natal where it prefers the open grass veldt, the grassy slopes of mountains up to 5,000 feet and the margins of forests.

I could find no evidence that it has any preference for soil types.

I observed this plant growing from 100 miles west of East London, up along the east coast to Durban. Throughout this area summer rainfall is predominant. For example, the rainfall at Durban is generally 4-5" in January and February and less than 1" in July. The average annual rainfall for the areas of its natural environment always exceeds 20" and ranges up to 50" per annum. The length of the growing season varies from 5 to 8 months.

Although I did not have the opportunity to study African daisy in the field in other areas of the Republic I did discuss its distribution at every chance I had with Department of Agriculture officers. From their knowledge the plant is now well established on the Cape Peninsula south of Cape Town under climatic conditions which are of course very similar to those in South Australia where it is so vigorous. However here and in other areas of the southern Cape Province it is rarely weedy. It sometimes colonises disturbed sites but does not grow as dense or as vigorously as it does in South Australia.

In 1967 Mr. D.W. Moyle presented to the Adelaide University a thesis, "Senecio pterophorus in South Australia" for his Honours Degree of B.A. in Geography. In this study he included a map of the distribution of African daisy supplied by Mr. J. Valmeyer of the Botanical Research Institute, Pretoria. I checked the distribution shown on this map with field officers in the areas of the Republic I visited and I believe it is an accurate picture of its distribution. With a few minor corrections it has been included at the end of this report for information (Map I).

For comparison, the present spread of African daisy in South Australia is shown in relation to rainfall on Map 2.

Moyle believes that the distribution of African daisy in South Australia is governed mainly by the length of the growing season. He claims that it requires at least five months which only occurs where the rainfall exceeds 20".

Obviously then the rainfall pattern does not control the distribution of African daisy. Although it grows in its natural environment under a summer rainfall pattern, in South Africa it can be found growing under winter rainfall conditions and also in South Australia where it is most weedy it also has a winter rainfall pattern.

A better guide to its distribution therefore seems to be its growing season which must exceed five months.

Considering its current distribution, both here and in South Africa, I am lead to believe that it has nowhere reached its ecological limits in Australia and in the course of time it could well spread through Victoria and right up the coast of New South Wales into Queensland.

III. THE WEEDINESS OF AFRICAN DAISY (S. pterophorus) IN SOUTH AFRICA:

African daisy is obviously a plant adapted to conditions of secondary succession. Throughout Natal it can be seen occasionally colonising disturbed roadside sites. It is very rarely a weed of agricultural significance.

Land owners claim that it is a poisonous plant. Technical people with whom I discussed this point were doubtful.

I was able to locate the following centres where African daisy is known to be weedy in the Republic:-

(1) On Cape Peninsula.

(2) At reserves near Grahamstown.

(3) At Postretief and Happy Valley - these are the worst infestations in the Eastern Cape (see Map III) and occur on grazing land.

(4) In the Stranger District of Natal where it is reported to be a problem in sugar plantations.

(5) Between Dohne and Konga near East London where it occurs on grazing land.

In the latter area I was able to study field infestations of African daisy with Mr. Francis Du Toit, Officer-in-Charge of the Dohne Research Institute.

At the Institute I saw two 50 acre paddocks infested with African daisy. These paddocks had been disturbed from the natural veldt and sweet veldt associations by the addition of nitrogen fertiliser. The fertiliser applications had opened the sward, allowing the African daisy to colonise. I was told that African daisy had also become a problem in over-grazed paddocks following early spring rains after unusually dry winters.

Control was maintained at the Institute by slashing which was delayed until the African daisy had reached the woody stage. One slashing was often sufficient and Mr. Du Toit did not regard it as a very aggressive weed. They did not like to see it because they feared stock poisoning which was common on the Centre from other Senecio species.

I discussed African daisy at length with a prominent farmer, Mr. Thompson, at Konga. He advised that to his knowledge scattered plants could be found on all surrounding properties in a 30 mile radius. Only when the natural vegetation was first ploughed on his property had it ever become a problem, then it disappeared after a year or two.

A discussion group was held on this plant at the Dohne Institute for my benefit. No officers had observed any insects feeding on it. Arrangements were made to send seed to Australia.

IV. GENERAL MORPHOLOGY OF AFRICAN DAISY (S. pterophorus) IN THE EASTERN CAPE PROVINCE:

I found African daisy (S. pterorphorus) which is growing as a weedy species between East London and Queenstown to have little resemblance to the plant which we have in South Australia.

The leaves are never greater than ½" in width nor longer than 2". Their under surfaces were white and woolly just as they are here. However, the upper surface colour is very much more grey than on the plants found in South Australia.

It never grows higher than 2'6" and it does not appear to be as woody as it grows in South Australia. By comparison plants grow to 12' in South Australia and produce stems as thick as the wrist.

I could also not find the prominent wings down the stem which is so obvious on South Australian specimens. On some plants the winging was present but hard to see.

I found a few plants flowering. The flowers are smaller than on South Australian specimens and grow in clumps of either 4 or 5 heads grouped over the top of the plant.

Various hyyrid forms of this plant are known in South Africa and I believe that very careful taxonomic studies are required to find the exact species or form which is growing in South Australia.

With this in view studies have been commenced by Mr. P.M. Kloot (Research Officer, Weed Control), at the Northfield Laboratories of the South Australian Department of Agriculture.

Seed gathered at the Dohne Research Institute is being examined for germination and growth characteristics and comparative studies, including genetic comparisons, will be made with South Australian material.

Considering current resources it is not anticipated that these studies will be concluded before the end of 1973.

V. THE FEASIBILITY OF BIOLOGICAL CONTROL STUDIES FOR AFRICAN DAISY:

I discussed the biological control of African daisy with Dr. Anneche, who is the Senior Entomologist in the Department of Agriculture Technical Services. He is stationed at Pretoria.

He had no present knowledge of any insects feeding on this particular Senecio species and could find no reference in any other literature. Certainly no specific work has been carried out. He did report that Dr. H.K. Munro, a field entomologist, had reared an unnamed Trypetidae from the flower heads of S. pterophorus, but I was unable to follow this up.

However, summarising the discussion I had with Dr. Anneche, I am convinced that the chances of finding insects feeding on African daisy would be very good indeed because:-

(1) African daisy is a woody species and in general a wide range of insects are found on similar species in South Africa.

(2) It is a perennial and as such makes a good home for many insect species.

(3) It is widely distributed to many climatic zones throughout South Africa and this again makes it a good subject for biological control.

I must stress that the form of African daisy which is so aggressive in South Australia appears morphologically different in some respects to those plants I saw in South Africa, and I feel that this matter must be cleared up before any attempts are made to search for biological control agents.

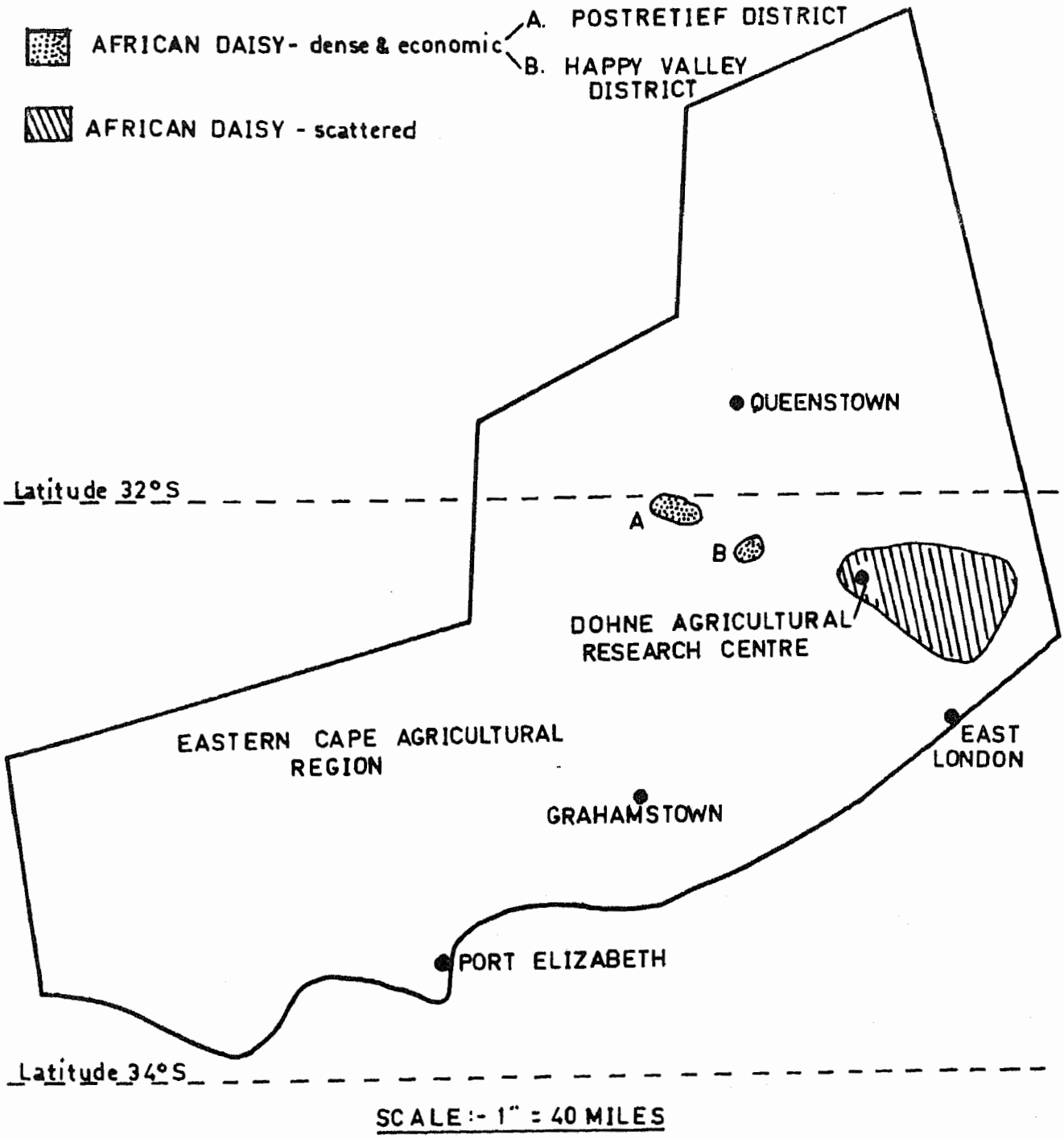
Ample sites for study can be found between East London and Grahamstown and as these are within 80-100 miles of the Rhodes University, I am sure African daisy should be added to the list of weeds proposed for biological control studies.

VI. RECOMMENDATIONS:

In view of the rapid spread of African daisy in inaccessible areas in South Australia and the probability that it will spread to other areas of Australia, it is recommended that high priority be given to research for biological control agents and that these studies be based at the Rhodes University, Grahamstown where it is proposed that other Australian weeds of African origin be studied.

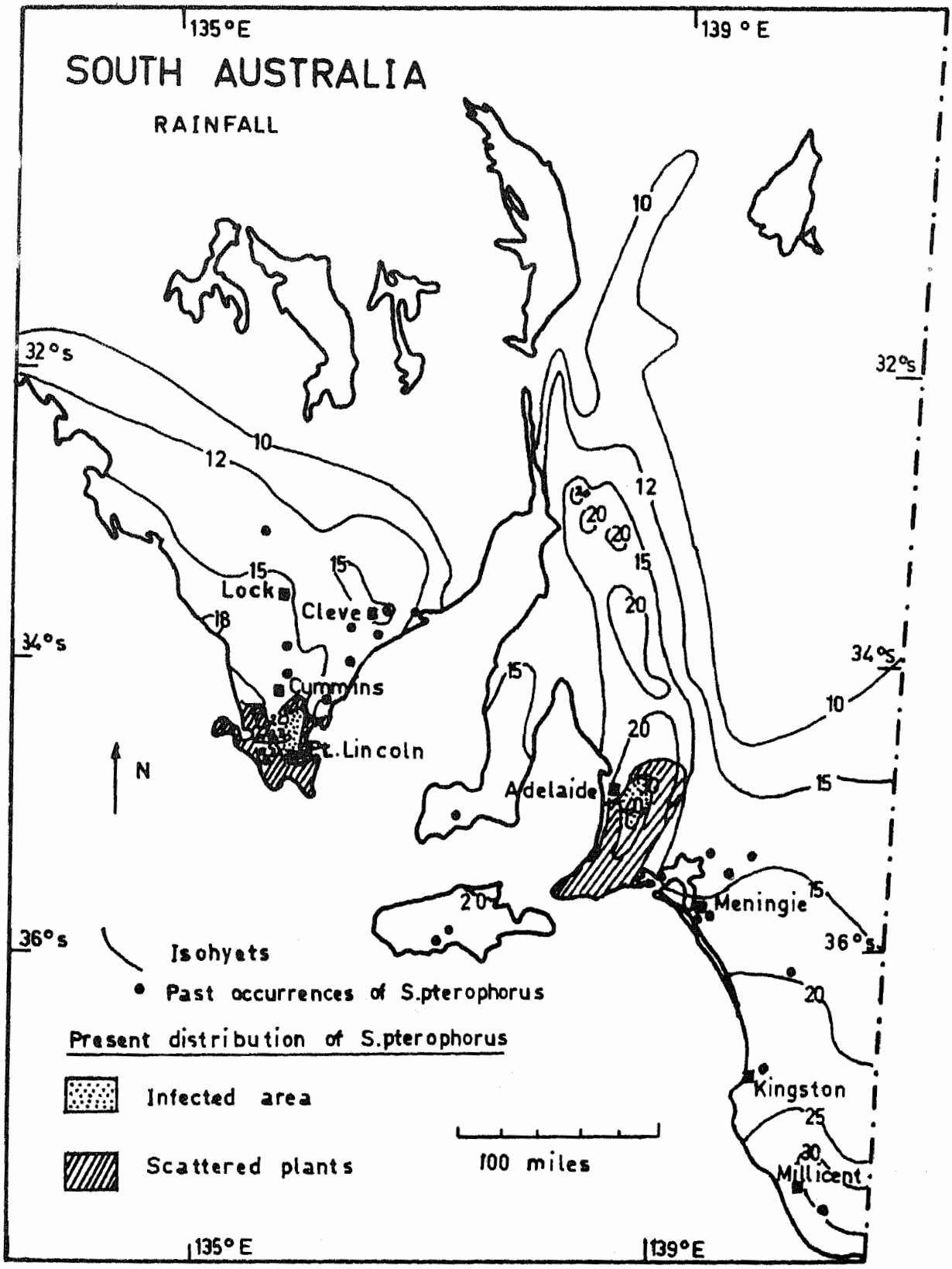
It is also recommended that the taxanomic studies initiated in South Australia be concluded as quickly as possible as a basis for the biological control research.

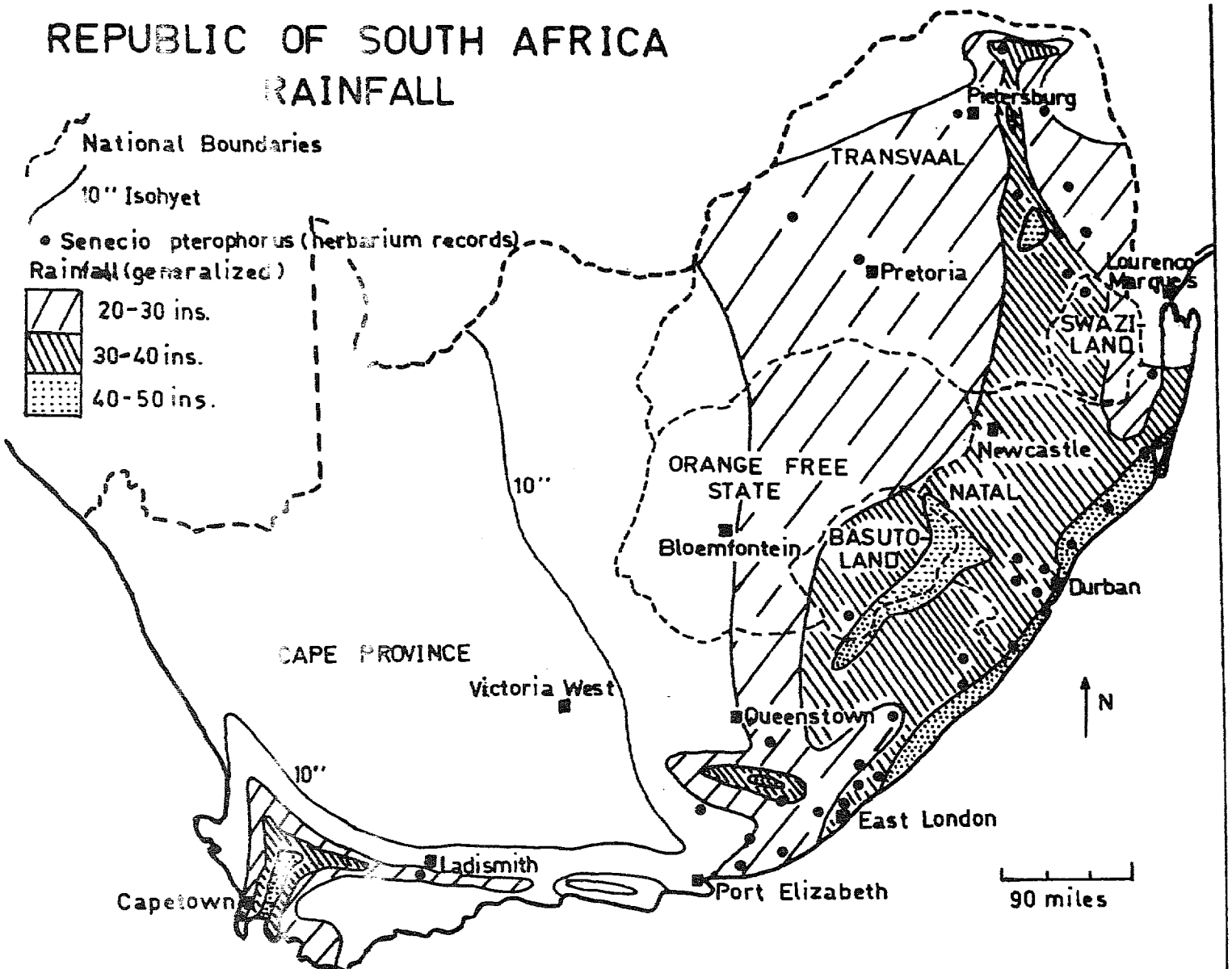
AREAS IN THE EASTERN CAPE AGRICULTURAL REGION WHERE SENECIO PTEROPHORUS IS REGARDED AS A WEED



SCALE:- 1" = 40 MILES

PRESENT DISTRIBUTION OF AFRICAN DAISY IN RELATION TO RAINFALL IN SOUTH AUSTRALIA




REPUBLIC OF SOUTH AFRICA
RAINFALL
National Boundaries
10" Isohyet
• Senecio pterophorus (herbarium records)
Rainfall (generalized)
20-30 ins.
30-40 ins.
40-50 ins.
Pietersburg
TRANSVAAL
Pretoria
Lourenco Marques
SWAZI-LAND
Newcastle
ORANGE FREE STATE
NATAL
Bloemfontein
BASUTO-LAND
Durban
10"
CAPE PROVINCE
Victoria West
Queenstown
N
10"
East London
Ladismith
Capetown
Port Elizabeth
90 miles