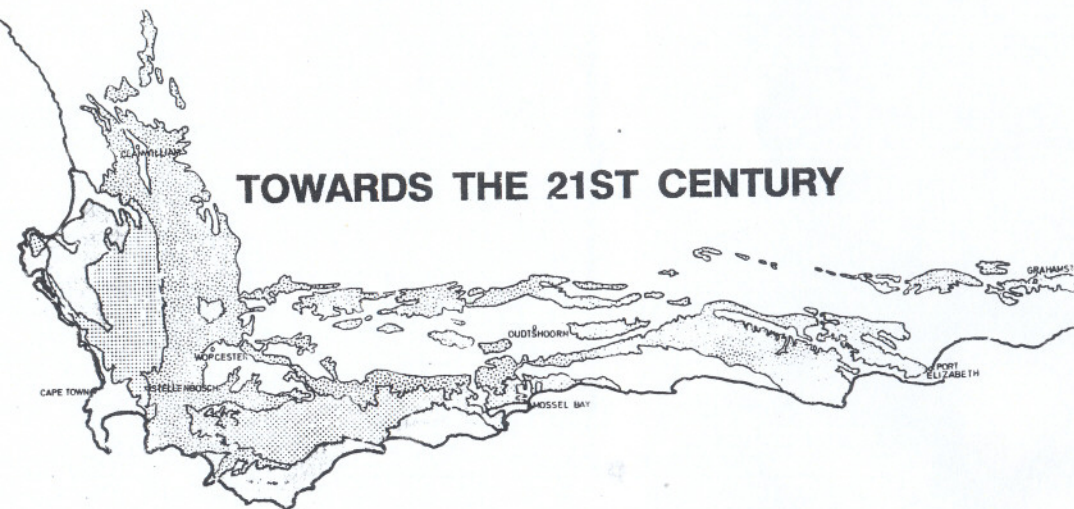


**1990 ANNUAL RESEARCH MEETING
OF THE
FYNBOS BIOME**

University of Stellenbosch

1-2 October 1990



TOWARDS THE 21ST CENTURY

1990 JAARLIKSE NAVORSINGSVERGADERING

**VAN DIE
FYNBOSBLOOM**

Universiteit van Stellenbosch

1-2 Oktober 1990

TABLE OF CONTENTS

	Page
OBJECTIVES	3
PROGRAMME	4
ABSTRACT OF PAPERS	11
ABSTRACT OF POSTERS	20
ADDRESS LIST OF PARTICIPANTS	23

OBJECTIVES

1. To provide a forum for the informal exchange and review of research findings;
2. To allow discussion on future research needs and priorities; and
3. To discuss ways and means for the communication and implementation of research results to user agencies.

PROGRAMME

Monday, 1 October

07:00 REGISTRATION
AND SETTING UP OF POSTERS (Botany Department, University of Stellenbosch)
(A registration fee of R20,00 per person will cover the costs of conference literature, teas and the cocktail party)

SESSION I Chairman: Dr C Boucher, University of Stellenbosch

08:30 WELCOME AND INTRODUCTION
Dr N Fairall, Chief Directorate: Nature and Environmental Conservation

08:40 - 09:00 OPENING ADDRESS
Dr R D Walmsley, Foundation for Research Development

09:05 - 09:35 PAST ACHIEVEMENTS AND FUTURE PROSPECTS FOR RESEARCH IN THE FYNBOS
Dr R M Cowling, University of Cape Town

CONTRIBUTED PAPERS

(20-minute talks which include 5 minutes for discussion)

09:40 - 10:00 GREENHOUSE GUESSES AND THE FUTURE OF FYNBOS
M Meadows & R Washington, University of Cape Town

10:05 - 10:25 GENETIC VARIATION IN A FYNBOS FROG,
HELEOPHRYNE PURCELLI
A Channing, University of the Western Cape

10:30 TEA

SESSION II Chairman: Mr C J Burgers, Chief Directorate:
Nature and Environmental Conservation

11:00 - 11:20 SPECIATION IN THE CAPE FLORA
H P Linder, University of Cape Town

11:25 - 11:45 COMPETITION AND COEXISTENCE IN
SOUTHERN CAPE PROTEACEAE
J J Midgley & L Watson, Division of Forest Science
and Technology, CSIR

11:50 - 12:10 A REGENERATION SURVEY IN LOWLAND
PROTEACEAE
W J Bond & R M Cowling, University of Cape Town

12:15 - 12:35 CLIMATE CHANGE AND SEEDLING
RECRUITMENT OF SEROTINOUS PROTEACEAE
D C Le Maitre, Division of Forest Science and
Technology, CSIR

12:40 - 13:00 LOTTERY MODELS FOR COEXISTENCE OF
SEROTINOUS PROTEOIDS
H Laurie, R M Cowling, University of Cape Town &
D C Le Maitre, Division of Forest Science and
Technology, CSIR

13:00 LUNCH

SESSION III Chairman: Prof E J Moll, University of Cape Town

14:00 - 14:40 COMPARISON OF FYNBOS AND CHAPARRAL
Prof J Keeley, Occidental College, Los Angeles

14:45 - 15:05 THE CAPE HONEYBEE AND THE FYNBOS
H R Hepburn & A Jacot Guilarmod, Rhodes
University

15:10 - 15:30 OBSERVATIONS ON INSECT POLLINATION OF
PELARGONIUM, SECTION *CAMPYLIA*
D J McDonald, National Botanical Institute

15:30 TEA

SESSION IV Chairman: Mrs R Stanvliet, Chief Directorate:
Nature and Environmental Conservation

16:00 - 16:20 INSECTS AS POLLEN VECTORS OF A RARE
FYNBOS ENDEMIC, *AUDOUINIA CAPITATA*
M G Wright, D Visser & J H de Lange, Fynbos
Research Unit

16:25 - 16:45 MICROORGANISMS, INCLUDING NITROGEN-
FIXING BACTERIA, IN SOILS AND RHIZO-
SPHERES OF FYNBOS PLANTS IN SWARTBOS-
KLOOF, JONKERSHOEK
M A Loos, K S Dreyer, M A Mulder & S M le
Roux, University of Stellenbosch

17:00 COCKTAIL PARTY
(C J Langenhoven Students' Centre, University of
Stellenbosch)

TUESDAY, 2 OCTOBER

SESSION V Chairman: P T Manders, Division of Forest Science and Technology, CSIR

- 08:15 - 08:45 A MANAGER'S VIEW OF RESEARCH NEEDS IN THE FYNBOS
J E Lensing, Chief Directorate: Nature and Environmental Conservation
- 08:50 - 09:10 THE FYNBOS BIOME AS A BIOSPHERE RESERVE: FRAMEWORK FOR A HOLISTIC CONSERVATION STRATEGY
C J Burgers, N Fairall & R H Andrag, Chief Directorate: Nature and Environmental Conservation
- 09:15 - 09:35 FYNBOS CONSERVATION AND COASTAL TOWNSHIPS
A V Hall, University of Cape Town
- 09:40 - 10:00 TOWARDS CONSERVATION OF FYNBOS; THE ROLE OF INSECTS IN THE BIOLOGICAL CONTROL OF AUSTRALIAN ACACIAS
D Donnelly, Plant Protection Research Institute
- 10:00 TEA
- 10:30 - 10:50 PROGRESS TOWARDS THE BIOLOGICAL CONTROL OF THE INVASIVE WEEDS, *ACACIA SALIGNA* AND *HAKEA SERICEA* WITH THE AID OF PATHOGENS
M J Morris, Plant Protection Research Institute

- 10:55 - 11:15 THE IMPORTANCE OF INFORMATION AND DECISION SUPPORT SYSTEMS IN THE MANAGEMENT OF FYNBOS ECOSYSTEMS
B W van Wilgen, Division of Forest Science and Technology, CSIR

SESSION VI : POSTER SESSION

Chairman: Professor H R Hepburn, Rhodes University

Poster authors will each be given the opportunity of presenting a short (maximum 5 minutes) verbal presentation of their poster

- 11:30 G.I.S. FYNBOS FANTASIA
E R Ashton & M Webster, Cape Town City Council
- FYNBOS REGENERATION AFTER PINE FELLING ON TABLE MOUNTAIN
H Homann & C Wagner, Orange Kloof Forest Station
- AN EVALUATION OF A RENOSTERVELD CONSERVATION POSTER
M Hoole & Janice Barrett, Chief Directorate Nature and Environmental Conservation
- SEED BIOLOGY IN *LEUCADENDRON XANTHOCONUS* (PROTEACEAE)
G Davis, National Botanical Institute
- DYNAMICS OF SOIL-STORED SEED BANKS IN TWO ERICOID SHRUB SPECIES
D J Kilian & R M Cowling, University of Cape Town
- INTERPRETING SPECIES DOMINANCE VS SPECIES RICHNESS IN FYNBOS
D C Le Maitre, Division of Forest Science and Technology, CSIR

STUDIES OF SEEDLING COMPETITION IN
PARASERLIANTHES LOPHANTHA, *ACACIA*
MELANOXYLON AND *ACACIA MEARNsii*

P J Pieterse, Plant Protection Research Institute &
C Boucher, University of Stellenbosch

SEASONAL MICROBIAL ATP AND BIOMASS
TRENDS IN TWO MOUNTAIN FYNBOS SOILS

C A van Reenen & Prof M A Loos, University of
Stellenbosch

REVEGETATION OF CAMPS BAY RESERVOIR -
5 YEARS ON

C Wagner, City Council of Cape Town

RARE FYNBOS PLANTS: FUGITIVES FROM
INSECT HERBIVORES?

M G Wright, D Visser & E K van der Merwe,
Fynbos Research Unit

13:00

LUNCH

**SESSION VII DISCUSSION OF FUTURE FYNBOS BIOME
RESEARCH**

**Chairman: N Fairall, Chief Directorate: Nature
and Environmental Conservation**

14:00

GENERAL MEETING

- Effects of commercial flower picking on fynbos -
B Louw, Vogelgat Nature Reserve
- Management of mountain catchments

- Government funding for fynbos research (DEA) -
B W van Wilgen, Division of Forest Science and
Technology, CSIR

- Community-based approach to conservation
management in the "New South Africa" -
G S Ruddock, Chief Directorate: Nature and
Environmental Conservation

- Future meetings

15:30

TEA

16:00

CLOSING COMMENTS AND PRIZE-GIVING

16:30

DEPARTURE

ABSTRACTS OF PAPERS

GREENHOUSE GUESSES AND THE FUTURE OF FYNBOS

M Meadows & R Washington

Department of Environmental & Geographical Science

University of Cape Town

Private Bag

7700 RONDEBOSCH

Much attention has been drawn recently to the phenomenon of global warming and the climates of the 21st Century; the possible effects of such climatic changes on fynbos ecosystems have, naturally, attracted a good deal of speculation. But to what extent are we able to accurately predict the rate and magnitude of climatic changes associated with an enhanced Greenhouse effect? How useful are the scenarios of vegetation change that can be stretched? Where can we best concentrate our research efforts in order to better manage the fynbos future? This paper examines the commonly held misconceptions concerning future environmental changes and suggests more fruitful research directions for fynbos ecologists.

GENETIC VARIATION IN A FYNBOS FROG, *HELEOPHRYNE PURCELLI*

H Barday & A Channing

Biochemistry Department

University of the Western Cape

Private Bag X17

7535 BELLVILLE

Starch gel electrophoresis was used to study the variation in genes coding for 16 enzymes. We studied tadpoles from eight localities. This species is part of an old group, and its genetic variation may shed light on the relationships of other organisms from mountain fynbos.

SPECIATION IN THE CAPE FLORA

H P Linder

Botany Department

University of Cape Town

Private Bag

7700 RONDEBOSCH

The patterns of speciation in the Cape Floristic Region are analysed, using sister-species pair analysis. The sisters are determined by cladistic methods, and data from the Restionaceae (*Rhodocoma*) and several genera of the Orchidaceae are presented. These locate a range of ecological factors (edaphic, altitudinal, climatic and vegetation successional) as driving forces: allopatric speciation is not as common as previously thought.

COMPETITION AND COEXISTENCE IN SOUTHERN CAPE PROTEACEAE

J J Midgley & L Watson

Division of Forest Science and Technology

CSIR

Jonkershoek Forestry Research Centre

Private Bag X5011

7600 STELLENBOSCH

Nearest neighbour interactions amongst Proteaceae were determined at sites on the Swartberg and Outeniqua Mountains. We compared nearest neighbour distances at the inter and intra-specific levels. Also we compared the incidence of inter and intra-specific nearest neighbour pairs. Dispersion patterns within fixed plots were determined. Our results are discussed in terms of already published models for coexistence of fynbos Proteaceae.

A REGENERATION SURVEY IN LOWLAND PROTEACEAE

W J Bond & R M Cowling

Botany Department

University of Cape Town

Private Bag

7700 RONDEBOSCH

Patterns of recruitment of serotinous Proteaceae in mountain fynbos are fairly well documented. However little is known about fire responses of lowland Proteaceae despite their importance in the flower harvesting industry. We surveyed seedling and pre-burn densities in a large number of burnt areas in southern Cape lowlands. Results indicate several important differences from mountain fynbos. We interpret results in terms of the impact of harvesting, appropriate fire frequencies and seasons and possible effects of different fire regimes on species coexistence.

CLIMATE CHANGE AND SEEDLING RECRUITMENT OF SEROTINOUS PROTEACEAE

D C Le Maitre

Division of Forest Science and Technology

Jonkershoek Forestry Research Centre

Private Bag X5011

7600 STELLENBOSCH

Seed germination patterns and seedling survival of *P. neriifolia* were studied in the Swartboskloof catchment, Jonkershoek. A simple model is developed which relates seed germination and seedling survival to rainfall patterns and evaporation. This model is used to illustrate the potential effects of climate change on seedling recruitment of serotinous Proteaceae.

LOTTERY MODELS FOR COEXISTENCE OF SEROTINOUS PROTEOIDS

H Laurie, R Cowling & D Le Maitre

Department of Applied Mathematics

University of Cape Town

Private Bag

7700 RONDEBOSCH

Lottery models have been proposed as an explanation for the coexistence of ecologically similar species with overlapping generations. We extend this to cover the case of discrete interfire generations. We apply the model to coexisting stands of *P. repens* and *P. neriifolia* at Jonkershoek, and conclude that stochasticity of the fire regime by itself is insufficient to explain coexistence in this case. We examine the effect of variation in inflorescence production on coexistence.

THE CAPE HONEYBEE AND THE FYNBOS

H R Hepburn & A Jacot Guillarmod

Department of Zoology & Entomology

Rhodes University

P O Box 94

6140 GRAHAMSTOWN

The Cape honeybee, *Apis mellifera capensis*, is a unique race of honeybee with a distribution closely matching that of the fynbos. We report that swarming and migration cycles of brood rearing, thermoregulation and foraging, as expressed in the Cape honeybee display a startling compatibility with the diversity of the flora, geographic variations in flowering cycles, and the warm winter berg winds of the fynbos. This is the first highly mobile animal having a primarily fynbos distribution. The east to west gradients in flowering phenology for the fynbos (based on regional texts) were closely correlated with similar geographic and time gradients in the colony life of the Cape honeybee.

OBSERVATIONS ON THE INSECT POLLINATION OF
PELARGONIUM, SECTION CAMPYLIA

D J McDonald

Botanical Research Unit
National Botanical Institute
P O Box 471
7600 STELLENBOSCH

A brief taxonomic overview of the genus *Pelargonium* with particular emphasis on the section Campylia is presented. Section Campylia is then treated in greater depth, detailing the relationships between the ten species recognized in the section. Four species, *Pelargonium capillare* (Cav.) Willd., *P. tricolor* Curt., *P. ocellatum* Van der Walt and *P. incarnatum* (L' Herit.) Moench., all with distinctive embossed 'warty areas' on at least the posterior petals, are highlighted. The significance of the warty areas for the attraction of insect pollinators is discussed. Attention is focussed on the pollination of *Pelargonium tricolor*. From consistent observations it is concluded that the warty areas on the *Pelargonium* species in question are effective in attracting dipteran pollinators. In the case of *P. tricolor*, *Megapalpus capensis*, a bombyliid fly, is particularly attracted to the embossed, black areas on the posterior petals.

INSECTS AS POLLEN VECTORS OF RARE FYNBOS ENDEMIC,
AUDOUINIA CAPITATA

M G Wright, D Visser & J H de Lange
Fynbos Research Unit (VOPRI)
Private Bag
7607 ELSENBURG

The role of insects as pollen vectors of *Audouinia capitata* (L.f) Brongn. (Bruniaceae), was studied. Frequency of encounter of flower visiting insects and pollen load counts showed that small pollen feeding beetles (Nitidulidae) should be the best insect pollen vectors. Short distance pollen dispersal by these insects, however, reduces their beneficial impact on the plants. It is proposed that poor pollen transfer may be one of the reasons for the scarcity of *A. capitata*. Implications for the future of the species in nature are discussed.

MICROORGANISMS, INCLUDING NITROGEN-FIXING BACTERIA, IN
SOILS AND RHIZOSPHERES OF FYNBOS PLANTS IN SWARTBOS
KLOOF, JONKERSHOEK

M A Loos, K S Dreyer, M A Mulder & S M le Roux
Department of Microbiology
University of Stellenbosch
7600 STELLENBOSCH

Dilution plate counts of filamentous fungi, aerobic bacteria and aerobic nitrogen-fixing bacteria in three mountain soils under fynbos in Swartbos Kloof, Jonkershoek, during 1988-9 were in the ranges $2,7 \times 10^4$ - $3,5 \times 10^5$, $4,0 \times 10^5$ - $3,8 \times 10^6$ and $4,9 \times 10^5$ - $1,8 \times 10^7$ /g dry soil, respectively. Counts occasionally decreased but mainly increased in the rhizospheres of fynbos plants of the families Proteaceae and Iridaceae to yield rhizosphere count:soil count (R:S) ratios of 0,5-12,1:1, 0,8-14,4:1 and 1,6-24,1:1 for the fungi, bacteria and nitrogen-fixers, respectively. The rhizosphere and soil counts for the aerobic nitrogen-fixing bacteria were regularly higher than those for the aerobic bacteria, but direct microscopic counts of the bacteria in non-rhizosphere soils ($4,12 \times 10^8$ - $2,60 \times 10^9$ /g soil) indicated that both groups constituted only small proportions of the total bacteria in the soils. The large populations of nitrogen-fixing bacteria may be of great significance in maintaining a supply of nitrogen for plant nutrition in the nitrogen-poor mountain fynbos soils.

THE FYNBOS BIOME AS A BIOSPHERE RESERVE: FRAMEWORK
FOR A HOLISTIC CONSERVATION STRATEGY

C J Burgers, N Fairall & R H Andrag
Chief Directorate: Nature and Environmental Conservation
Western Cape Research Unit
Jonkershoek
Private Bag X5014
7600 STELLENBOSCH

A single biosphere reserve encompassing the whole fynbos biome is proposed. Existing conservation areas would form the core of the biosphere reserve, and would be linked together as a network of

conservation areas by the voluntary inclusion of privately owned land. Key elements of the concept would be a landscape-level approach to ecosystem protection and management, integration of conservation and development, active involvement of the public at a local community level and close cooperation between resource conservation and resource development agencies. The biosphere reserve should be implemented within the framework of a regional conservation strategy and national land capability classification, which should form the basis for decisions on land acquisition to ensure an adequate system of core conservation areas.

FYNBOS CONSERVATION AND COASTAL TOWNSHIPS

A V Hall

Bolus Herbarium

University of Cape Town

Private Bag

7700 RONDEBOSCH

Landowners in coastal townships have conflicting expectations about the natural quality of their fynbos and normal domestic needs. These conflicts are widely overlooked: at best they get patchy attention, at worst benign neglect. On the one hand, landowners are delighted with their Fynbos, but expect to have their house surrounded by lawns and sheltering trees, often invasive alien Kikuyu and Acacia. Gradualism and over-dense urban planning ensures that the original expectations of natural, wild quality vanish with time. Suppression of fire causes high fuel loads with the risk of disastrous fire-storms. Landowners get almost no advice on the taxonomic contents, rarity and ecological needs of their fynbos. Research is needed on fire management of fynbos among resort houses; reviews of urban density and fynbos survival; and functional replacements for useful but invasive plants. This has major implications for the financial success of the burgeoning tourist industry.

TOWARDS CONSERVATION OF FYNBOS: THE ROLE OF INSECTS IN THE BIOLOGICAL CONTROL OF AUSTRALIAN ACACIAS

D Donnelly

Plant Protection Research Institute

Private Bag X5017

7600 STELLENBOSCH

A number of Australian *Acacia* spp. are important weeds in fynbos. Two of these species are also crops. The conflict of interest that this has created for biological control has largely been resolved by considering insects that attack reproductive plant parts. To date, eight Australian insect species have been considered in the *Acacia* biocontrol programme, of which four have already been released. In addition, two indigenous insect species have potential for biocontrol. In this paper, the agents are reviewed, and the strengths and weaknesses of the respective projects are discussed.

PROGRESS TOWARDS THE BIOLOGICAL CONTROL OF THE INVASIVE WEEDS, *ACACIA SALIGNA* AND *HAKEA SERICEA* WITH THE AID OF PATHOGENS

M J Morris

Plant Protection Research Institute

Private Bag X5017

7600 STELLENBOSCH

Acacia saligna and *Hakea sericea* are two of the most important invasive weeds of the fynbos. Due to the large areas infested with these weeds, and the high cost of adverse environmental effects of mechanical and chemical control, biological control programmes have received priority. An Australian gall-forming rust fungus, *Uromycladium tepperianum*, was first released into stands of *A. saligna* in South Africa during 1987. Since then the fungus has been established at over 80 sites throughout the southern and south-western Cape Province. A fungus, *Colletotrichum gloeosporioides*, was found to be the cause of a locally occurring disease of *H. sericea*. A wheat bran formulation of this fungus effectively controlled young *H. sericea* seedlings emerging after a fire. Commercial production of a formulation of the fungus is currently being investigated.

THE IMPORTANCE OF INFORMATION AND DECISION SUPPORT SYSTEMS IN THE MANAGEMENT OF FYNBOS ECOSYSTEMS

B W van Wilgen

Division of Forest Science and Technology

CSIR

Jonkershoek Forestry Research Centre

Private Bag X5011

7600 STELLENBOSCH

Much has been done towards gaining an understanding of the way in which fynbos ecosystems function. Many models have been developed to predict fire behaviour and effects, the potential spread of invasives, the population dynamics of fynbos plants under different fire regimes, the effects of fire on catchment water production, and so on. Despite this, the practical problems of integrating this knowledge, and using it to make rational management decisions remains largely unsolved. The increasing demands on managers, combined with the knowledge explosion, means that the new solutions offered by rapidly developing information systems technologies are the only way in which rational ecosystem management will be achieved. This paper describes recent developments in this field, and describes (by means of examples) how the management of fynbos ecosystems can be improved through their application.

ABSTRACTS OF POSTERS

AN EVALUATION OF A RENOSTERVELD POSTER

J Barrett & M Hoole

Chief Directorate: Nature & Environmental Conservation

Private Bag X9086

8000 CAPE TOWN

The Chief Directorate Nature and Environmental Conservation produces posters for the purpose of creating awareness of conservation issues. However, current research suggests that the design of these posters is not effective, and that the posters are not a viable means of conveying conservation messages.

Furthermore, the CDNEC is particularly concerned about the conservation status of renosterveld in the south-western Cape, and in an initial attempt to inform land-owners, a "renosterveld" poster was designed. However, when the poster was presented to a group of farmers the results were disappointing.

The poster, and an accompanying information leaflet - both as yet unpublished - are on display, and some critical comment would be appreciated.

SEASONAL MICROBIAL ATP AND BIOMASS TRENDS IN TWO MOUNTAIN FYNBOS SOILS

C A van Reenen & M A Loos

Department of Microbiology

University of Stellenbosch

7600 STELLENBOSCH

Microbial ATP and biomass were monitored in granite-derived Glenrosa and sandstone-derived Clovelly soils in Swartbos Kloof, Jonkershoek, from March 1987 to May 1989. Biomass was calculated from direct microscopic

bacterial, actinomycete and fungal biovolume determinations. The ATP showed peaks during spring/early summer and late summer/autumn, and declined during summer and winter. Microbial biomass carbon showed negative linear correlations ($r = -0,83$ to $-0,58$) with ATP per mg biomass carbon, suggesting that ATP was a poor indicator of viable microbial biomass. However, the ATP would have depended on the metabolic activity of the soil microbial populations as well as their biovolume; furthermore, the staining technique used for the microscopic biovolume determinations did not differentiate viable from dead cells. Nevertheless, we concluded that spring/early summer and late summer/autumn were the seasons most favourable for microbial development, in contrast to the dry summers and cold, wet winters when populations and their activity declined. The inverse relationships between ATP per mg biomass-C and biomass-C seems attributable to more constant levels of ATP than biomass through the seasons, but the basic reasons for this difference are at present unknown.

BEST PAPER AWARDS FOR FYNBOS RESEARCH MEETING

Two awards will be made at the conclusion of the Fynbos Research Meeting.

1. BEST STUDENT PAPER

Presented for the best scientific paper delivered by a full-time registered post-graduate student (or students). Written proof from their supervisor that the main part of their paper has been done by themselves must please be provided.

2. BEST RESEARCH PAPER

Presented to the best scientific paper delivered by a researcher (or researchers).

CRITERIA FOR AWARD WILL BE:

- Confidence of speaker
- Clarity of speech
- Logic of presentation
- Quality of visual material
- Impact on Fynbos Research Programme
- Consideration of scientific principles

The judges reserve the right not to make any award should papers not be deemed to be of a satisfactory standard.

The judges will remain anonymous throughout the meeting and their decision will be final. No further discussions will be entered into after the prize-giving.

LIST OF PARTICIPANTS

ASHTON E R (MRS), CAPE TOWN CITY COUNCIL, PARKS & FORESTS BRANCH,
C/O UNIVERSITY OF CAPE TOWN, BOTANY DEPARTMENT, ECOLAB,
RONDEBOSCH 7700 TEL: (021) 6502448

ATTWELL ROELF (MR), P O BOX 31, BETTY'S BAY, 7141 TEL: (02823) 9617

BEKKER S J (MNR), HOOFDIREKTORAAT: NATUUR EN OMGEWINGSBEWARING,
PRIVAATSAK X6546, GEORGE, 6530 TEL: (0441) 741568

BELL I C (MR), FARMER, P O BOX 125, GANSBAAI, 7220 TEL: (02834) 9732

BOND W J (DR), BOTANY DEPARTMENT, UNIVERSITY OF CAPE TOWN,
PRIVATE BAG, RONDEBOSCH, 7700 TEL: (021) 6503771

BOUCHER C (DR), DEPARTMENT OF BOTANY, UNIVERSITY OF STELLENBOSCH
STELLENBOSCH, 7600 TEL: (02231) 773064

BRITS G J (MR), SEED RESEARCH, NATIONAL BOTANICAL INSTITUTE,
KIRSTENBOSCH, PRIVATE BAG X7, CLAREMONT, 7735 TEL: (021) 7621166

BRITTON PEN (MR), PARKS AND FORESTS BRANCH, CITY COUNCIL OF CAPE
TOWN, 75 LYMPLEIGH ROAD, PLUMSTEAD, 7800 TEL: (021) 2102369

BURGERS C J (MNR), HOOFDIREKTORAAT: NATUUR EN OMGEWINGS-
BEWARING, WES-KAAP NAVORSINGSEENHEID, JONKERSHOEK, PRIVAATSAK
X5014, STELLENBOSCH 7600 TEL: (02231) 70180

CARELSE R J E (MNR), HAWEQUAS STAATSBOS, PRIVAATSAK X14,
HUGUENOT, 7845

CHANNING ALAN E (PROF), DEPT OF BIOCHEMISTRY, UNIVERSITY OF THE
WESTERN CAPE, PRIVATE BAG X17, BELLVILLE 7535 TEL: (021) 9592261

COETZEE J H (DR), FYNBOS RESEARCH UNIT, PRIVATE BAG, ELSENBURG, 7607
TEL: (02231) 94620

COWLING R M (DR), DEPARTMENT OF BOTANY, UNIVERSITY OF CAPE TOWN,
RONDEBOSCH, 7700 TEL: (021) 6502440

DAVIS G W (DR), STRESS ECOLOGY UNIT, NATIONAL BOTANICAL INSTITUTE,
PRIVATE BAG X16, RONDEBOSCH, 7700 (021) 6503686

DE KOKER T H (MNR), DEPARTEMENT MIKROBIOLOGIE, UNIVERSITEIT VAN
STELLENBOSCH, STELLENBOSCH, 7600 TEL: (02231) 774529

DE LANGE C (MISS), CHIEF DIRECTORATE: NATURE AND ENVIRONMENTAL
CONSERVATION, PRIVATE BAG X6546, GEORGE, 6530 TEL: (0441) 741568

DE SWARDT D C (MR), FYNBOS RESEARCH UNIT, PRIVATE BAG, ELSENBURG,
7607 TEL: (02231) 94620

DE WITT J B (MR), CHIEF DIRECTORATE: NATURE AND ENVIRONMENTAL
CONSERVATION, PRIVATE BAG X9005, CAPE TOWN, 8000 TEL: (021) 4617010

DONIAN I (MR), CHIEF DIRECTORATE: NATURE AND ENVIRONMENTAL
CONSERVATION, PRIVATE BAG X6546, GEORGE, 6530 TEL: (0441) 741568

DONNELLY DI (MISS), PLANT PROTECTION RESEARCH INSTITUTE, PRIVATE
BAG X5017, STELLENBOSCH, 7600 TEL: (02231) 76943

DU PREEZ DESIREÉ (MRS), CHIEF DIRECTORATE: NATURE AND
ENVIRONMENTAL CONSERVATION, PRIVATE BAG X9086, CAPE TOWN, 8000
TEL: (021) 4834088

ELOFF J N (PROF), DIREKTEUR: NAVORSING, NASIONALE BOTANIESE
INSTITUUT, PRIVAATSAK X101, PRETORIA, 0001 TEL: (012) 861164

ERASMUS W Z (MNR), DEPARTMENT OF ENVIRONMENT AFFAIRS, PRIVATE
BAG X9005, CAPE TOWN, 8000

FAIRALL N (DR), JONKERSHOEK NATURE CONSERVATION STATION, PRIVATE
BAG X5014, STELLENBOSCH, 7600 TEL: (02231) 70111

FERREIRA J F (DR), PLANT PATHOLOGIST, FYNBOS RESEARCH, PRIVATE BAG,
ELSENBURG, 7606 TEL: (02231) 94620

GLYNN J (MR), CHIEF DIRECTORATE: NATURE AND ENVIRONMENTAL
CONSERVATION, PRIVATE BAG X6546, GEORGE, 6530 TEL: (0441) 741568

GRAY ANNE (MRS), KNORHOEK ESTATE, P O BOX 4, SIR LOWRY'S PASS, 7133
TEL: (024) 533000

HALL A V (PROF), BOLUS HERBARIUM, UNIVERSITY OF CAPE TOWN,
RONDEBOSCH, 7700 TEL: (021) 6503772

HARDCASTLE P M (MR), CONSERVATION FORESTRY, CHIEF DIRECTORATE: NATURE AND ENVIRONMENTAL CONSERVATION, PRIVATE BAG X9005, CAPE TOWN, 8000 TEL: (021) 4617010

HEPBURN H R (PROF), DEPT OF ZOOLOGY & ENTOMOLOGY, P O BOX 94, RHODES UNIVERSITY, GRAHAMSTOWN, 6140 TEL: (0461) 22023

HERHOLDT J P (MNR), SONDEREND-STAATSBOS, POSBUS 128, ROBERTSON, 6705

HILL P W (MR), CHIEF DIRECTORATE: NATURE AND ENVIRONMENTAL CONSERVATION, PRIVATE BAG X9086, CAPE TOWN, 8000 TEL: (021) 4833392

HOLMES P M (DR), DEPARTMENT OF BOTANY, UNIVERSITY OF CAPE TOWN, RONDEBOSCH, 7700 TEL: (021) 6502448

HOMANN H (MR), ORANGE KLOOF FOREST STATION, MAIN ROAD, HOUT BAY, 7800 TEL: (021) 7901023

HOOLE MARION (MRS), CHIEF DIRECTORATE: NATURE AND ENVIRONMENTAL CONSERVATION, PRIVATE BAG X9086, CAPE TOWN, 8000 TEL: (021) 4834234

JOHNS M S F (MR), CHIEF DIRECTORATE: NATURE AND ENVIRONMENTAL CONSERVATION, NUWEBERG, PRIVATE BAG X27, ELGIN 7180

JUSTUS C (MR), CAPE TECHNIKON, P O BOX 652, CAPE TOWN, 8000 TEL: (021) 4616367

KEELEY J (PROF), C/O DR W J BOND, DEPARTMENT OF BOTANY, UNIVERSITY OF CAPE TOWN, RONDEBOSCH, 7700

KILIAN DARRELL (MR), DEPARTMENT OF BOTANY, UNIVERSITY OF CAPE TOWN, RONDEBOSCH, 7700 TEL: (021) 6502440

LAAN R W (MNR), HOOFDIREKTORAAT: NATUUR EN OMGEWINGSBEWARING, PRIVAATSAK X9005, KAAPSTAD, 8000 TEL: (021) 4617010

LAURIE HENRI (MR), DEPARTMENT OF APPLIED MATHEMATICS, UNIVERSITY OF CAPE TOWN, RONDEBOSCH 7700 TEL: (021) 6502332

LE MAITRE D C (MR), DIVISION OF FOREST SCIENCE AND TECHNOLOGY, JONKERSHOEK FORESTRY RESEARCH CENTRE, CSIR, PRIVATE BAG X5011, STELLENBOSCH, 7600 TEL: (02231) 72805

LENSING J E (MNR) HOOFDIREKTORAAT: NATUUR EN OMGEWINGSBEWARING, JONKERSHOEK NATUURBEWARINGSTASIE, PRIVAATSAK X5014, STELLENBOSCH 7600 TEL: (02231) 70111

LINDER H P (DR), DEPARTMENT OF BOTANY, UNIVERSITY OF CAPE TOWN, RONDEBOSCH, 7700 TEL: (021) 6503398

LOOS M A (PROF), DEPARTEMENT MIKROBIOLOGIE, UNIVERSITEIT VAN STELLENBOSCH, STELLENBOSCH, 7600 TEL: (02231) 774532

LOUW BRENDA (MISS), VOGELGAT NATURE RESERVE, P O BOX 115, VOELKLIP, 7203 TEL: (0283) 24500

MANDERS P T (MR), DIVISION OF FOREST SCIENCE AND TECHNOLOGY, CSIR, JONKERSHOEK FORESTRY RESEARCH CENTRE, PRIVATE BAG X5011, STELLENBOSCH 7600 TEL: (02231) 72805

MARAIS C (MR), CONSERVATION FORESTRY, CHIEF DIRECTORATE: NATURE AND ENVIRONMENTAL CONSERVATION, PRIVATE BAG X9005, CAPE TOWN, 8000 TEL: (021) 4617010

MAREE J O (MR), DEPARTMENT OF ENVIRONMENT AFFAIRS, PRIVATE BAG X447, PRETORIA, 0001 TEL: (012) 3103673

MCDONALD DAVID J (MR), BOTANICAL RESEARCH UNIT, NATIONAL BOTANICAL INSTITUTE, P O BOX 471, STELLENBOSCH TEL: (02231) 70208

MCLENNAN S (MR), PLANT PROTECTION RESEARCH INSTITUTE, PRIVATE BAG X5017, STELLENBOSCH, 7600 TEL: (02231) 74690

MEADOWS MIKE E (DR), DEPT OF ENVIRONMENTAL AND GEOGRAPHICAL SCIENCE, UNIVERSITY OF CAPE TOWN, RONDEBOSCH, 7700 TEL: (021) 6502877/2873

MIDDELMANN W J (MR), 13 LADY ANNE AVENUE, NEWLANDS, 7700 TEL: (021) 644410

MIDDELMANN MARYKE (MRS), SOUTH AFRICAN PROTEA PRODUCERS AND EXPORTERS (SAPPEX), PRIVATE BAG X10, BOTRIVER, 7185 TEL: (02824) 49745

MIDGLEY J J (DR), DIVISION OF FOREST SCIENCE AND TECHNOLOGY, CSIR, SAASVELD FORESTRY RESEARCH CENTRE, PRIVATE BAG X6515, GEORGE 6530 TEL: (0441) 2065/59

MOLL E J (PROF), DEPARTMENT OF BOTANY, UNIVERSITY OF CAPE TOWN, RONDEBOSCH, 7700 TEL: (021) 6502445

MORRIS M J (DR), PLANT PROTECTION RESEARCH INSTITUTE, PRIVATE BAG X5017, STELLENBOSCH, 7600 TEL: (02231) 75243

MUSTART P J (MRS), DEPARTMENT OF BOTANY, UNIVERSITY OF CAPE TOWN, RONDEBOSCH, 7700 TEL: (021) 6502448

NEL J A J (PROF), DEPARTEMENT SOÛLOGIE, UNIVERSITEIT VAN STELLENBOSCH, STELLENBOSCH, 7600 TEL: (02231) 773226

O'CALLAGHAN M (MR), NATIONAL BOTANICAL INSTITUTE, P O BOX 471, STELLENBOSCH, 7600 TEL: (02231) 70208

PARSLEY R (MRS), PARSLEY'S CAPE SEEDS, 1 WOODLAND ROAD, SOMERSET WEST, 7130 TEL: (024) 512630

PARSLEY A (MR), PARSLEY'S CAPE SEEDS, 1 WOODLAND ROAD, SOMERSET WEST, 7130 TEL: (024) 512630

PIETERSE P J (MNR), BIOLOGIESE ONKRUIDBEHEERSEKSIE, NASIONALE INSTITUUT VIR PLANTBESKERMING, PRIVAATSAK X5017, STELLENBOSCH, 7600 TEL: (02231) 72579

POOL/STANVLIET RUIDA (MS), HOOFDIREKTORAAT: NATUUR EN OMGEWINGSBEWARING, PRIVAATSAK X5014, STELLENBOSCH 7600 TEL: (02231) 70130

PRETORIUS G (MNR), SEDERBERG-STAATSBOS, PRIVAATSAK X1, CITRUSDAL, 7340

PRINS P J (MNR), KAAPSTAD STADSRAAD, POSBUS 91, GRABOUW, 7160

PRINSLOO V I (MNR), SONDEREND-STAATSBOS, POSBUS 128, ROBERTSON, 6705

RAITT L M (DR), DEPARTMENT OF BOTANY, UNIVERSITY OF THE WESTERN CAPE, PRIVATE BAG X17, BELLVILLE, 7535 TEL: (021) 9592306

RICHARDS MICHAEL B (MR), BOTANY DEPARTMENT, UNIVERSITY OF CAPE TOWN, RONDEBOSCH, 7700 TEL: (021) 6502448

RUDDOCK G S (MR), CHIEF DIRECTORATE: NATURE AND ENVIRONMENTAL CONSERVATION, PRIVATE BAG X27, ELGIN, 7180 TEL: (0225) 4301

RUTHERFORD M C (DR), NATIONAL BOTANICAL INSTITUTE, PRIVATE BAG X16, RONDEBOSCH, 7700 TEL: (021) 6503684/6

SEYDACK A H W (MR), DEPARTMENT OF ENVIRONMENT AFFAIRS, SOUTHERN CAPE FOREST REGION, PRIVATE BAG X12, KNYSNA, 6570 TEL: (0445) 23037

SHAW K A (MR), CHIEF DIRECTORATE: NATURE AND ENVIRONMENTAL CONSERVATION, PRIVATE BAG X9005 CAPE TOWN, 8000 TEL: (021) 4617010

SOUTHWOOD A J (MR) CHIEF DIRECTORATE: NATURE AND ENVIRONMENTAL CONSERVATION, PRIVATE BAG X6546, GEORGE 6530 TEL: (0441) 741568

STOCK W D (DR), DEPARTMENT OF BOTANY, UNIVERSITY OF CAPE TOWN, RONDEBOSCH 7700 TEL: (021) 6502442

STRYDOM A A J (MR), CONSERVATION FORESTRY, CHIEF DIRECTORATE: NATURE AND ENVIRONMENTAL CONSERVATION, PRIVATE BAG X9005 CAPE TOWN, 8000 TEL: (021) 4617010

SUGDEN J M (DR), DEPARTMENT OF BOTANY, UNIVERSITY OF CAPE TOWN, RONDEBOSCH 7700 TEL (021) 6503398

VAN DER MERWE S W, (MR), STATE FORESTER, ALGERIA FORESTRY STATION, PRIVATE BAG X1, CITRUSDAL 7340

VAN DER MERWE ENID (MISS), FYNBOS RESEARCH UNIT, PRIVATE BAG, ELSENBERG 7607 TEL: (02231) 94620

VAN DER WALT J P L (MR), CHIEF DIRECTORATE: NATURE AND ENVIRONMENTAL CONSERVATION, PRIVATE BAG X6546, GEORGE 6530 TEL: (0441) 741568

VAN WILGEN B W (DR), DIVISION OF FOREST SCIENCE AND TECHNOLOGY, JONKERSHOEK FORESTRY RESEARCH CENTRE, CSIR, PRIVATE BAG X5011, STELLENBOSCH 7600 TEL: (02231) 72805

VERMEULEN W J (MNR), DEPARTEMENT VAN OMGEWINGSAKE, BOSSTREEK SUID-KAAP, PRIVAATSAK X12, KNYSNA 6570 TEL: (0445) 23037

VLOK J H J (MR), CHIEF DIRECTORATE: NATURE AND ENVIRONMENTAL CONSERVATION, P O BOX 123, DE RUST 6650 TEL: (04439) 2152

VON KASCHKE O M (MNR), BONTEBOK NASIONALE PARK, POSBUS 149, SWELLENLIDAM 6740 TEL: (0291) 42735

WAGNER CAROL (MRS), CITY ENGINEER'S DEPARTMENT, PARKS AND FORESTS BRANCH. P O BOX 1694, CAPE TOWN 8000 TEL: (021) 210 2142

WALMSLEY R D (DR), MANAGER, FOUNDATION FOR RESEARCH DEVELOPMENT, P O BOX 2600, PRETORIA 0001 TEL (012) 841 3634

WEINBERG C P (MNR), HAWEQUAS STAATSBOS, PRIVAATSAK X14, HUGUENOT 7845

WEST A (MR), CHIEF DIRECTORATE: NATURE AND ENVIRONMENTAL CONSERVATION, PRIVATE BAG X6546, GEORGE 6530 TEL: (0441) 741568

WIENAND KAREN (MISS), DEPARTMENT OF BOTANY, UNIVERSITY OF CAPE TOWN, RONDEBOSCH 7700 TEL (021) 6502448/2

WRIGHT M G (MR), FYNBOS RESEARCH UNIT (VOPRI), PRIVATE BAG, ELSENBURG 7607 TEL: (02231) 94620 X215

SECRETARIAT

BREITENBACH M A (MEV), FOUNDATION FOR RESEARCH DEVELOPMENT, P O BOX 2600, PRETORIA, 0001 TEL: (012) 8413633

**ORGANIZING COMMITTEE
FOR THE 1990 RESEARCH MEETING**

Dr N Fairall (Convener), Jonkershoek Nature Conservation Station

Dr C Boucher, University of Stellenbosch

Mr C J Burgers, Jonkershoek Nature Conservation Station

Mr P T Manders, CSIR, FORESTEK

Ms R Pool, Jonkershoek Nature Conservation Station

Mrs M A Breitenbach (secretariat), Foundation for Research Development