

SAAB Annual Congress, Stellenbosch.

1979.

11

SUMMARIES/OPSOMMINGS

AMORY, A. & C.F. CRESSWELL. THE INFLUENCE OF NITRATE AND AMMONIUM NITROGEN ON THE PHOTOSYNTHETIC ENZYMES RIBULOSE BIPHOSPHATE CARBOXYLASE, RIBULOSE BIPHOSPHATE OXYGENASE AND PHOSPHOENOL PYRUVATE CARBOXYLASE, AND PHOTOSYNTHETIC CHARACTERISTICS OF C_4 PLANTS

Nitrogen as nitrate, and ammonium nitrogen supplied at increasing concentrations to the *in vitro* assays of Ribulose biphosphate carboxylase (RuBPC) and Ribulose biphosphate oxygenase (RuBPO) resulted in increased RuBPC and RuBPO activities in Themeda triandra but had little effect on the activities of the enzymes from Zea mays.

With increasing levels of nitrate vacuum infiltrated into nitrogen starved leaves of Themeda triandra and Zea mays, the photosynthetic rate and carbon dioxide compensation point increased. Infiltration of increasing ammonium nitrogen concentrations resulted in photosynthetic rates decreasing with increasing carbon dioxide compensation points in both plants.

These results will be discussed in relation to possible influences of nitrogen on the photosynthetic and photorespiratory metabolism.

BATE, G.C., B.H. WALKER & B.G. FENDLE*. WATER RELATIONS OF VEGETATION IN THE KUISEB RIVER

A number of different methods for the measurement of leaf transpiration under field conditions were used to estimate water loss from trees growing in the Kuiseb River, South West Africa. These included the detached weight-loss method, plastic bag condensation, cuvette gravimetric, and potometer methods.

Allometric relationships were used to relate leaf dry weight to stem basal area, and belt transects were surveyed to facilitate the calculation of total water loss by transpiration per day per unit length of riverine vegetation.

BERJAK, P. TOWARDS AN UNDERSTANDING OF SALT EXCRETION IN AVICENNIA MARINA

Mature leaves of A. marina excrete salt solution from the apparently gland-free abaxial surface. The process is suggested to be characterised by a salt accumulation phase (presumably to a threshold concentration) followed by an excretion phase. Ultrastructurally in the mesophyll, the accumulation phase is characterised by formation of secondary vacuoles — plasmalemma invaginations which protrude into the vacuole and are cut off there — suggesting a direct apoplast-vacuole transfer of the salt. During the excretory phase formation of elaborate whorls of chloroplastic membrane, the outermost of which is intimately associated with the tonoplast, occurs; the plasmalemma also become markedly invaginated at loci between chloroplasts and wall. Cytochemical evidence supports the suggestion that during excretion ions are actively removed from the vacuole, via the chloroplasts, across the plasmalemma, and into the apoplast. The saline solution is then suggested to accumulate intercellularly, and evidence exists supporting its ultimate elimination as a liquid, via the stomata.

BEZUIDENHOUT, J. ONTBINDING VAN PLANTMATERIAAL IN DIE NYLSVLEY-SAVANNE

Die ontbinding van sewe dominante plantspesies in Nylsvley-Savanne is bestudeer. As indekse van mikrobe-aktiwiteit is ATP-inhoud, CO_2 -produksie en mikrobe-propaguletelings gebruik. Die chemiese verandering van die plantmateriaal en die klimaatstoestand wat 'n invloed het op ontbinding is nagegaan. Die vernaamste resultate is:

Die massaverlies van grasblare was in die orde van 70 persent per jaar, terwyl die ooreenstemmende verlies van Ochna-Burkea-blare van 9 tot 15 persent was. Die afbraaktempo's van organiese verbindings was soos volg:

lignien < sellulose < hemisellulose < suikers.

'n Vinnige verlies van kalium en fosfaat vanuit die blaarmateriaal is waargeneem, terwyl 'n afname in die C/N-verhouding plaasgevind het. Die ATP-inhoud van plantreste het gevarieer van 1,2 fg ATP g⁻¹ tot 0,2 fg g⁻¹. Hierdie variasie in ATP-inhoud kan toegeskryf word aan abiotiese en/of populasie-variasie.

Die fungus- en bakterietellings was in die orde van 10⁶ en 10⁷ g⁻¹ respektiewelik. Die aktinomisietelling was in die beginstadias van ontbinding laag, maar het 'n opwaartse neiging getoon en na 10 maande van ontbinding was die aktinomisiet:bakterieverhouding ongeveer 1:10.

Deur die strooiselmasa en die manometriese koolsuurgasproduksie te gebruik, is afgelei dat 250 mg koolsuurgas m⁻² d⁻¹ en 550 mg koolsuurgas m⁻² d⁻¹ van die strooiselkomponent in die oop- en boomhabitat geproduseer word.

BOTHA, C.E.J. & P. HERMAN. OIL DUCTS IN ARTEMISIA AFRA JACQ.

The occurrence and position of the oil ducts in A. afra was investigated. Transverse and radial longitudinal sections of fresh as well as fixed stem, petiole, rachis and leaflet material was examined at the light microscope level. In an attempt to localize the oil-containing ducts, freehand as well as freezing microtome sections were mounted in water and stained with Sudan IV. Anatomical localization of the oil ducts was achieved using paraffin and Spurr's-embedded material. Oil ducts were found in the ground parenchyma tissue in the stem and petiole. In the stem, oil ducts occur external to the vascular tissue. In the petioles and petiolules, they occur on the adaxial side of the vascular tissue. During the investigation, it was noted that for a given plant specimen, few oil ducts could be recognised at the light microscope level. The question which arises at this point is that other parenchymatous cells may in fact secrete some of the abundant essential oils found in this composite.

BOTHA, M.J.T. & J.H. JOOSTE*. ASPEKTE VAN DIE MINERALE VOEDING VAN ACACIA SALIGNA

Acacia saligna is veral van belang as indringer in die fynbosgemeenskap.

Die invloed van verskillende NaCl-konsentrasies tydens drie stadia van ontwikkeling is ondersoek. 'n Besondere bestandheid teenoor hoë soutkonsentrasies is waargeneem, behalwe tydens ontkieming van die saad.

Hoë mangaankonsentrasies het toksiese effekte tot gevolg gehad.

'n Lae stikstofbehoefte is aangetoon.

BOUCHER, D.A. & J.J.A. VAN DER WALT. DIE SEKSIE MYRRHIDIUM VAN PELARGONIUM

Die taksonomiese hersiening van die Suid-Afrikaanse verteenwoordigers van die seksie Myrrhidium word bespreek en geïllustreer. Enkele anatomiese kenmerke wat van taksonomiese belang in hierdie seksie is, word ook kortliks behandel.

BREDENKAMP, G.J. & G.K. THERON*. ASPEKTE VAN DIE PLANTEGROEI VAN DIE MANYELETI-WILDTUIN

Die Manyeleti-wildtuin is aangrensend aan die Nasionale Krugerwildtuin net suid van Orpen geleë en beslaan ongeveer 30 000 hektaar. Die plantegroei word deur Acocks as Dorre laeveld geklassifiseer. Die plantegroei is met behulp van die Braun-Blanquet-tegniek asook 'n groeperingsanalise geanaliseer en geklassifiseer. 'n Groot totaal van 41 plantgemeenskappe wat in ses hoofplantgemeenskappe geklassifiseer kan word, is geïdentifiseer. Elke gemeenskap kan aan die hand van die habitat wat veral grondfaktore insluit, sinvol ekologies geïnterpreteer word.

Die hoofgemeenskappe is die volgende:

1. Combretum zeyheri-gemeenskappe op die granietbulte, meestal op sanderige gronde wat die Wasbank, Cartrif, Glenrosa, Mispah, Hutton en Clovelly grondvorme insluit.
2. Spirostachys africana-gemeenskappe wat op klipkoppies en in droë rivierlope aangetref word.
3. Acacia nigrescens-gemeenskappe wat op die laerliggende dele dikwels aan die voet van die granietbulte op effens meer kleierige gronde van die Swartland, Valsrivier, Escourt, Sterkspruit en Glenrosa grondvorme aangetref word.
4. Combretum collinum-gemeenskappe op die rooi Shortlands en Hutton gronde.
5. Albizia harveyi-gemeenskappe op laagliggende, oop dele langs rivierlope op redelik kleierige gronde van die Arcadia, Sterkspruit, Willowbrook en Bonheim grondvorme.
6. Setaria nigrirostris-gemeenskappe wat op doleriet op die kleingronde van die Arcadia en Rensburg grondvorme.

CAMPBELL, W.E. & G.M.L. CRAGG. ALKALOIDS, COUMARINS AND ESSENTIAL OILS FROM THE RUTACEAE

The systematic investigation for the presence of alkaloids and coumarins and the study of the composition of the essential oils in a number of plants from the family, Rutaceae, is described.

From Phyllosma capensis, two new S-prenyl thioesters and a new coumarin have been isolated.

The structures of the purified compounds have been elucidated mainly by proton magnetic resonance and mass spectrometry studies. The essential oil composition has been determined by gas chromatography/mass spectrometry.

Both the possible chemotaxonomic significance of these natural products and the role of coumarins in the plants is discussed.

COETZEE, J.C. & A. EICKER. FISILOGIESE ASPEKTE VAN SEKERE FUNGUSSE WAT PROBLEME SKEP IN DIE SAMPIOENBEDRYF IN SUID-AFRIKA

Voordat 'n organisme doeltreffend bestry kan word, is dit nodig om die werking van daardie organisme te ken.

Die sampioenbedryf het te kampe met vele probleme, waarvan kompeterende en patogene fungusse maar een faset is. Desnieteenstaande die omvang van die probleme wat deur die swamme veroorsaak word, is daar nog bitter min bekend oor meeste van die organismes, veral in soverre dit die fisiologie daarvan aangaan. Twee sulke swamme is Verticillium fungicola en Chromelosporium fulvum, die eerste 'n patogeen en die ander 'n kompeteerder van die kommersiële sampioen, Agaricus brunnescens.

'n Intensiewe fisiologiese studie van hierdie twee swamme is aangepak met die doel om meer kennis in te win ten einde effektiewer bestrydingsmaatreëls teen die organismes te probeer daarstel. Resultate van enkele aspekte, nl. die invloed van lig, temperatuur en die koolstofbron sal bespreek word.

COWLING, R. & B.M. CAMPBELL. CONVERGENCE IN VEGETATION STRUCTURE IN THE MEDITERRANEAN COMMUNITIES OF CALIFORNIA, CHILE AND SOUTH AFRICA

Plant communities on desert to montane transects in the mediterranean type climatic areas in southern California, central Chile and the Cape, South Africa have been analysed to determine the extent of vegetation convergence. Data on characters of the woody vegetation such as floristic richness, growth form, leaf duration, leaf size, and spinescence, collected by Parsons & Moldenke (1975) from analogous sites in California and Chile, were compared to data from analogous sites in the Cape. Considerable convergence in vegetation structure between floristically distinct but climatically similar sites in California and Chile has been demonstrated by Parsons & Moldenke. Cape vegetation, however, shows little convergence to the other mediterranean regions. We hypothesize that the lack of convergence between certain

communities of the Cape (the fynbos communities) and the communities of the other regions is due to the evolution of the fynbos in a nutrient poor edaphic environment. The exceptionally high species richness of fynbos is explained in terms of this hypothesis. Most previous intercontinental comparisons have stressed the importance of climate in determining convergence. We believe that climate alone is insufficient to determine vegetation convergence.

CRESPO, H. & C.F. CRESSWELL. C_3 AND C_4 PHOTOSYNTHETIC CHARACTERISTICS ON A SINGLE ZEA MAYS PLANT

The activities of the carboxylating enzymes ribulose-biphosphate carboxylase (RuBPC) and phosphoenolpyruvate carboxylase (PEPC) in leaves of three week old Zea mays plants grown under phytotron conditions were found to vary according to leaf position. In the lower leaves the ratio of the two carboxylating enzymes PEPC : RuBPC was less than unity, which is typical of plants exhibiting C_3 photosynthesis, while the upper leaves exhibited a ratio greater than unity, typical of plants exhibiting C_4 photosynthesis. The carbon dioxide compensation point, and net photosynthetic rates also differed in the lower and upper leaves, the former corresponding to values associated with C_3 photosynthetic plants and the latter with C_4 photosynthetic plants.

The fine structure of the two types of leaves also differed. The effect of light intensity on these observations will be discussed.

CRESSWELL, C.F. THE PHOTOSYNTHETIC AND RESPIRATORY CHARACTERISTICS OF SELECTED FYNBOS PLANTS OF THE WESTERN CAPE

The photosynthetic characteristics of selected plants from the proteoid, restioid, grasses, and bulbous plants of the fynbos will be presented and discussed in relation to their distribution.

CRESSWELL, C.F., G.C. BATE & M. COLLINS. THE AMINO ACID COMPOSITION OF ZEA MAYS IN RELATION TO SOURCE OF NITROGEN SUPPLY

The level of the free amino acid pool increased as the nutrient supply of nitrogen increased irrespective of whether supplied as nitrate or ammonium nitrogen, however the level of the free pool was greater with nitrate than ammonium nitrogen. Differing levels of amide production were found with plants, grown in nitrate or ammonium nitrogen. High levels of glutamine were present in both the roots and the leaves when grown with nitrate, whereas asparagine was the predominant amide when grown with ammonium nitrogen.

Plants grown initially in nitrate nitrogen, and then transferred to ammonium nitrogen showed within 24 hours a two fold increase in soluble amino acids compared to when grown solely in nitrate or ammonium nitrogen at the same level of nitrogen.

When the inhibitor of glutamine synthetase, methionine sulfoximine was incorporated into the nutrient medium there was a marked decline in amide levels, with an accompanying increase in the levels of leucine and valine. Leucine being the predominant amino acid, despite the level of glutamic acid remaining constant. These results will be discussed.

DAVEY, J.E. & J. VAN STADEN. CYTOKININ CHANGES DURING RIPENING IN NORMAL AND MUTANT TOMATO FRUITS

Fruit ripening, which is essentially a senescence phenomenon, has been shown to be retarded by applied cytokinins, and it has been suggested that the ripening process is controlled by endogenous cytokinins. Cytokinin levels in a normal strain of tomato (Lycopersicon esculentum Mill. var. Rutgers) were therefore compared with those of its non-ripening mutant (rin). Normal ripening tomato fruits were found to contain lower cytokinin levels than the non-ripening mutant tomatoes. The cytokinin content of both strains was high at the light green (breaker) stage and decreased as the fruits senesced. This decrease was more pronounced in the normal fruits. It is suggested that the high

levels of endogenous cytokinin in the mutant fruits are involved in delaying the ripening process

DAWSON, B.L. THE RE-ESTABLISHMENT OF A PLANT COVER ON DISTURBED LOCALITIES IN ROAD RESERVES

This paper deals briefly with reclamation practices in National Road Reserves. Previous standard techniques are discussed and evaluated, and attention is drawn to the shortcomings of these techniques.

The ecologically unsound practice involving the use of a standard seed mixture, regardless of local climatic and soil conditions, is discussed. The vague specifications concerning topsoil used and the limited knowledge of topsoil seed content are mentioned.

The necessity for stabilization of topsoil is stressed, and various stabilization methods discussed. The need for a suitably-adapted plant cover to be re-established is pointed out and research findings discussed. Mention is made of the current research direction involving ecotypes of *Eragrostis curvula* for inclusion in seed mixtures. The need for regular maintenance of road reserves based on a scientifically-derived programme, to guard against deterioration of established vegetation, is emphasised.

It is hoped that as a result of this research suitably-adapted seed mixtures, containing local species (particularly pioneers) and suitable ecotypes of *E. curvula*, can be specified on a national basis.

DE LA HARPE, A.C. DIE CO₂-KOMPENSASIEPUNT VAN 'N AANTAL PARASITIESE BLOMPLANTE

Met hierdie ondersoek is die CO₂-kompensasiepunt van 'n aantal stingel- en wortelparasiete met behulp van 'n CO₂-gasanaliseerder bepaal. Omdat die tempo van fotosintese gelyk is aan die tempo van respirasie, kan afleiding oor die fotosintetiese vermoë van 'n plant gemaak word. Resultate wat in hierdie ondersoek verkry is, sal bespreek word in die lig van bogenoemde.

DE SWARDT, G.H. VERBRUING VAN PROTEALOOFBLARE — PRIMêRE OORSAKE EN MOONTLIKE BEHEERMAATREËLS

Die verbruing van loofblare van spesies soos *Protea neriifolia* en *P. compacta* beïnvloed die dekoratiewe waarde nadelig en groot verliese word jaarliks tydens uitvoer deur produsente gely. Dit is vasgestel dat die drie belangrikste faktore wat na pluk tot die verskynsel aanleiding gee, soos volg is:

- (i) Oksidasie van sekere flavonoïedverbindinge;
- (ii) ensiëminhibisie deur leuko-antosianiene en
- (iii) vogverlies weens transpirasie.

Die aanwending van reduseermiddels, tannienbinders en antitranspirante as moontlike beheermaatreëls, is eksperimenteel ondersoek.

DE VILLIERS, O.T. & M.C.P. GLYN. IAA STIMULEER NIE BIOCHEMIESE PROSESSE IN GEÏSOLEERDE HIPOKOTIELESELLE VAN *PHASEOLUS VULGARIS* NIE

Om die meganisme van werking van IAA na te gaan, is metaboliese-aktiewe selle uit hipokotielweefsel van *Phaseolus vulgaris* geïsoleer. Vir hierdie doel is die invloed van verskillende faktore soos pH, sorbitolkonsentrasie, temperatuur en tyd van isolering van die selle nagegaan. Die invloed van verskillende konsentrasies van IAA op respirasie, RNA-, proteïen- en lipiedsintese is hierna in die selle nagegaan deur van geskikte ¹⁴C-substrate gebruik te maak.

Dit is gevind dat IAA die genoemde prosesse nie stimuleer soos wat voorheen met intakte hipokotielweefsel verkry is

nie. Voorebehandeling van intakte weefsel met IAA het egter tot 'n aansienlike stimulering van RNA- en proteïensintese gelei in selle wat uit hierdie weefsel geïsoleer is. Om hierdie resultate te verklaar, is nagegaan of die geïsoleerde selle moontlik nie die reseptor bevat wat IAA bind nie.

DL WET, J.S. DIE INVLOED VAN STIKSTOF MAAR VERAL ALS OP DIE GROEI VAN MICROCYSTIS UV 007

Water, een van die belangrikste natuurlike bronne van so 'n vinnig ontwikkelende land soos S.A., moet bewaar word. Daar word dus nou belanggestel in organiese afvalstowwe wat die water binnedring, veral stikstof.

Daar is werk gedoen op die verband tussen mg NO_3^- stikstofverbruik en turbiditeit in kletteenhede, verskillende stikstofkonsentrasies en verskillende als waarop die Microcystis UV 007 kan groei. Die resultate sal bespreek word.

DOWNING, B.H. & R.H. GROVES. ENVIRONMENTAL CONTROL OF GROWTH AND DEVELOPMENT OF SOME THEMEDA TRIANDRA POPULATIONS

Distinct morphological and physiological differences were found between plants of seven provenances of Themeda triandra when grown under controlled conditions in the Canberra phytotron. The provenances came from a range of sites with varying temperature regimes and different latitudes in Southern Africa.

The stems of plants of provenances from Zululand, Johannesburg and Bulawayo tended to elongate earlier and the primary tiller was always more dominant than in plants from the other 4 sites in which stem elongation was delayed and the primary tiller was less dominant. Seedlings of all provenances failed to establish at day temperatures below 15°C. The most favourable day/night temperature regime for flowering was 27/22°C. Failure of floral development at day temperature above 33°C limited anthesis and seed formation. Plants of one provenance (Pisternmaritzburg) failed to flower within the temperature range from 18/13° to 36/31°C. Vernalization treatments (15/5° for varying periods from 2 to 6 weeks), however, facilitated flowering in some provenances. Long day lengths, in excess of 12 hours, were needed for photo-induction of flowering of plants from all provenances.

The extent of physiological plasticity, as well as a range of genetic variability, both within and between provenances of T. triandra, shown in the results of these experiments is thought to account for its ecological success in the many climatic, edaphic and biotic conditions present in Southern Africa.

DURAND, B.J. PHENOLOGICAL ADAPTATIONS TO A FIRE ENVIRONMENT

The vegetation of a mediterranean type of climate is predisposed towards fire in more than one way. In the hot dry summers the vegetation is frequently subject to wild fires. The physical structure of the Cape Fynbos is in many cases optimum for hot and fast fires. Adaptations to the fire-environment of the South Western Cape have developed in the vegetation to such an extent that certain plants regenerate better after fire than in the absence of fire.

Phenological adaptations enhance structural adaptations to survive the cataclysm of a fire. Leucadendron laurcolum (Lam.) Fourcade is for example structurally adapted in that its seeds are protected in a serotinous cone. The cones dry out after a fire and release the seeds en masse. The structural adaptation is supported by a phenological adaptation. In this case there is a natural delayed release of mature seeds in the absence of a fire. When a fire occurs, there is a maximum of mature seeds available for mass dispersal. Most of the Erica species however rely on an abundance of seed that is released at random. Phenologically they are adapted to flower for extended periods or continually or at different times of the year and in the rainy season.

Conservation of the indigenous Fynbos flora, with special reference to rare and endangered species, can be streamlined by a knowledge of the phenology of the vegetation and its component species.

EICKER, A. & J.C. COETZEE. SUBSTRATE VIR GEBRUIK AS DEKLAAGMATERIAAL BY DIE VERBOUING VAN AGARICUS BRUNNESEENS

Met die industriële verbouing van eetbare sampioene moet die kompossubstraat op 'n bepaalde stadium met 'n 25 - 30 mm laag van 'n geskikte deklaagmateriaal bedek word ten einde die miselium te stimuleer om oor te gaan tot die vorming van besidiokarpe. Die tradisionele deklaag bestaan uit 'n mengsel van gemaalde veen en kalkklip. In Suid-Afrika is veen baie skaars en is die bestaande bronne feitlik uitgeput. Dit het dus gebiedend noodsaaklik geword om alternatiewe materiale te ondersoek wat die veen kan vervang.

'n Verskeidenheid van beskikbare organiese en anorganiese materiale word ondersoek ten einde hul geskiktheid as deklaagsubstraat te evalueer. Die mikrobiologiese, chemiese en fisiese eienskappe van die ondersoekte materiale sal bespreek word en hul invloed op sampioenproduksie aangedui word.

ELOFF, J.N. MIKROSKAALSINTESE VAN N-METIEL-L-ALANIEN EN METABOLISME IN GIBBLAAR (DICHAPELALUM CYMOSAM)

N-metiel-l-alanien (NMA) kom in baie hoë konsentrasie in Gibblaar voor. Om die metabolisme van hierdie verbinding te ondersoek is 'n mikroskaalsintese ontwikkel wat 'n finale opbrengs van 75,5 persent in vergelyking met 'n opbrengs van 37,8 persent vir 'n makroskaalsinteseproses wat in die literatuur beskryf is, lewer. Die metabolisme van NMA, metiel- ^{14}C en NMA - alanien - ^{14}C is vergelyk met die metabolisme van alanien- ^{14}C , metionien- ^{14}C , serien- ^{14}C . Uit hierdie resultate is afgelei dat die katabolisme van NMA - ^{14}C nie demetilering as 'n vroeë stap insluit nie en dat die biosintese van NMA en N-metiel-serien met metionien as metielskenkele respektiewelik uit alanien en serien plaasvind.

FINKELSTEIN, N. & D.E.A. RIVETT. CHEMOTAXONOMIC STUDIES ON THREE SOUTH AFRICAN ZANTHOXYLUM L. (= FAGARA L.) SPECIES (FAMILY : RUTACEAE)

The confusion in nomenclature between Zanthoxylum L. and the closely allied genus Fagara L. seems to have been settled following a chemotaxonomic assessment of the secondary metabolites of taxa from both genera. South African taxonomists have generally acknowledged this generic change; however, there appears to be some diversity of opinion at the species level.

Three South African Zanthoxylum species viz. Z. davyi (Verdoorn) Waterm., Z. thomcroftii (Verdoorn) Waterm. and Z. numbe (E.A. Bruce) Waterm. have been studied phytochemically and numerous alkaloids, biogenetically derived from anthranic acid and tyrosine, have been isolated and characterised. This paper assesses the chemotaxonomic potential of these secondary metabolites and also provides additional evidence of homogeneity in the African subsection Gerontogacae Engl. The N-methylated tetrahydroprotuberberine alkaloid, previously reported from only one African taxon, has now also been positively identified in these three taxa. The South African species of the genus so far investigated are therefore uniform in their ability to synthesize quaternary alkaloids having an N-methyltetrahydroprotuberberins nucleus — a feature so far undetected in taxa occurring elsewhere in Africa.

FUGLER, S.R. SOME ASPECTS OF THE AUTOECOLOGY OF THE THREE HAKEA PEST PLANTS

The three hakea pest-plants, Hakea sericea, H. gibbosa and H. suaveolens, which originate from Australia, invade fynbos and form dense infestations which exclude indigenous vegetation.

The main areas of infestation of these hakea species are enumerated. Since autecological research is aimed at backing up biocontrol using insects imported from Australia, the phenology of the three hakeas is described and a method of estimating seed destroyed by the insects is outlined.

GIBBS RUSSELL, G.E. & E.R. ROBINSON. THE EASTERN CAPE AS AN HOSTILE ENVIRONMENT

The Eastern Cape, delimited roughly as the area south of 32°S and lying between 24°E and the Great Kei River, may be classed as a hostile environment because of the great variability in its environmental conditions. This results in a great variety in the plant communities and numbers of plant species within this small area. Imposed on the basic mosaic are the effects of man's agricultural use, which have further changed the environment so that it is in many places no longer suitable for the naturally occurring vegetation.

The response of the vegetation to this environmental instability may be either on the community level or the species level. At the community level it may be expected both that the normal successional patterns would be interrupted and that vacant niches would be opened to the spread of invasive species. At the species level, plants may adapt to unpredictable change phenotypically or genotypically. Many of the dominant species of the Eastern Cape show a wide range of morphological variation. A changing environment may lead to disruptive selection which would favor speciation; on the other hand, changes in species ranges within a small area as a result of the delicately balanced inter-relationships of the communities may maintain gene flow between populations which in a less disturbed area may remain allopatric.

GRAY, V. & C.F. CRESSWELL. THE ELECTRON DONOR SYSTEM IN THE IN VIVO ASSAY OF NITRATE REDUCTASE, AND ITS EFFECT ON ACTIVITY

Sugars, α -keto acids, and uncouplers of oxidative phosphorylation are found to stimulate the in vivo activity of nitrate reductase, which is carried out in the dark under semi anaerobic conditions, measured by the formation of nitrite. From the data obtained it would appear that the in vivo system is dependent on respiratory metabolism for its electron donor. In contrast intact leaf tissue in the dark, containing nitrate, does not produce nitrite, and little reduction of nitrate appears to occur, however when placed in the light nitrate is reduced with no accumulation of nitrite.

The question arises whether a similar system is being measured by the in vivo assay, and nitrate reduction in intact leaves under light conditions, and whether the electron donor systems differ in each case.

The data obtained from experimental work will be discussed.

GROBBELAAR, N. & M.W. VAN ROOYEN. BIOLOGIESE STIKSTOFBINDING OP NYLSVLEY

Die tempo waarteen grondmonsters asetileen reduseer is periodiek oor 'n twee-jaar periode bepaal en hierdie resultate is, met sekere aannames, gebruik om 'n aanduiding te kry van die tempo waarteen biologiese stikstofbinding gedurende verskillende tye van die jaar plaasvind. Daar is ook getrag om vas te stel watter organismes verantwoordelik is vir meeste van die waargenome aktiwiteit wat veel hoër was as wat verwag is en uitsluitlik tot die somer en herfs beperk was.

GUNTON, C., G.C. BATE & D.M. DU PREEZ. MEASUREMENT OF THE TOTAL NITROGEN CYCLING IN BURKEA SAVANNA

The perfusion apparatus was used to measure the rate of nitrification in intact soil columns. The rate was measured by the amount of nitrate leached out into the perfusate. The addition of 30 ppm of $\text{NH}_4\text{-N}$ as ammonium sulphate to the soil, increased the initial rate of production by 0,55 ppm $\text{NO}_3\text{-N.day}^{-1}$. The overall rate was difficult to establish due to cyclic nitrate production and apparent denitrification.

The effect of plant root exudates on nitrate production were also investigated. Results indicate that exudates level out the cyclic rhythm of NO_3 production.

Soil nitrate and ammonia levels have been recorded at Nylsvley for almost a full year and recent results indicate that ammonia, like nitrate, decreases with increasing depth.

HALL, A.V. PROGRESS WITH STUDIES OF THREATENED PLANTS AT THE CAPE

A brief review is given of the background to the threatened plant problem at the Cape. The methods and results of a survey carried out since 1974 are noted. The theoretical problems that exist in creating a secure future for artificially threatened species are discussed. It is concluded that although extinction has been an important natural process in the past and may shape much of the evolutionary future of the Cape flora, it is critically under-studied.

JACOT GUILLARMOD, A. EXOTIC WEEDS AND MACCHIA VEGETATION IN THE EASTERN CAPE

During the past four years, the effects of removal of exotic weeds on 'false' macchia vegetation on a moist, Witteberg quartzite south-west facing slope (alt. ± 700 m) have been noted. The area is on the easternmost extension of the Suurberg range, in the Albany Division. Except for ≈ 5 ha of temperate evergreen forest, the entire area of 32 ha was densely covered with *Pinus* (a mixture of species and hybrids) and other exotic tree and shrub weeds. These have steadily been removed so that incident light conditions have improved, soil moisture content has increased and other factors have altered. The most notable change is, apart from the return to a macchia vegetation, the vast increase in numbers of *Erica* plants. In part, the recovery can be ascribed to several years of high rainfall following felling.

JARMAN, N.G. ASPECTS OF THE BIOLOGY OF VEMA SEAMOUNT

In 1964, Vema Seamount ($31^{\circ} 38' S, 8^{\circ} 20' E$) in the South East Atlantic was the first seamount ever to have been dived upon. In 1978 another diving expedition was mounted to collect the flora and fauna and to attempt to investigate the bioenergetics of this isolated underwater peak.

A detailed energy budget for a small portion of the peak was calculated. Annual production figures for the climax vegetation community, was estimated to be $\pm 850 \text{ gCm}^{-2} \text{ year}^{-1}$, comparable to production figures of kelp on the West Coast of South Africa.

The phytogeographical relationships of Vema appear to lie with the South Coast rather than with the closer West Coast of Southern Africa or the Island of Tristan de Cunha its other near neighbour.

JARMAN, N.G. *ECKLONIA MAXIMA* : ITS DISTRIBUTION AND PRODUCTION ON THE WEST COAST OF THE CAPE PENINSULA

The commercial value of *Ecklonia maxima*, a giant kelp, collected from South African shores is approximately R1 000 000; a distribution and biomass inventory of this resource on the West Coast of the Cape Peninsula has been carried out using colour aerial photography combined with *in situ* measurements.

A possible management programme to harvest kelp directly from the sea with minimal adverse environmental impact, based on recent and on-going research, will be discussed.

JARMAN, M.L. & T. JACKSON. THE USE OF REMOTE SENSING TECHNIQUES IN MAPPING VEGETATION IN THE LANGEBAAN AREA, SOUTH AFRICA

This study is part of an investigation into the usefulness of various remote sensing products in determining the extent of the Fynbos Biome and identifying and mapping its major components such as : area and extent of the Fynbos types; area and location of forests and possible identification of types; area and location of wetlands; area and location of various alien infestations; extent and monitoring of fire and post fire regeneration. The Langebaan Area ($33^{\circ} 05' S, 18^{\circ} E$) was chosen as a training site within the Fynbos Biome area as there was ground truth available to test the effectiveness of the Landsat-1 imagery for vegetation mapping. The vegetation of the Langebaan Area was mapped by Boucher & Jarman (1977) using 1:10 000 scale natural colour aerial photographs produced by the Department of Land Surveying, University of Natal, after a flight over the area on 26th March 1975. Correlation be-

tween this ground truth and Landsat-1, multispectral scanner image E-1055-08084 taken on 18 September 1972 was carried out using an unsupervised iterative clustering computer classification procedure. This produced a classification map with 17 distinct classes which were grouped together to form 8 mapping classes.

This correlation provides a base-map for monitoring any changes in extent of various vegetation features using data from Landsat-3 launched in March 1978.

JOHNSON, C.T. 'N ANATOMIESE, EKOLOGIESE EN TAKSONOMIESE ONDERSOEK VAN LEPTOSPERMUM FORST (MYRTACEAE)

Die blaar- en hout-anatomie is ondersoek. As gevolg van die groot variasie in anatomiese kenmerke is dit van beperkte waarde vir die taksonomie. Bentham se onderverdeling van die genus word ook nie ondersteun deur die anatomiese variasiepatroon nie. In sommige gevalle is dit egter moontlik om wedersydse verwantskappe tussen spesies te suggereer.

'n Vergelyking van beskikbare ekologiese data met anatomiese kenmerke, ondersteun die veralgemeende idee dat 'n korrelasie tussen xeromorfie en die beskikbaarheid van water bestaan. Oor die algemeen vertoon alle Leptospermum spesies, mesiese spesies ingeslote, xeromorfe kenmerke.

JONGENS, S.M. & D.T. MITCHELL. APPROACHES AND TECHNIQUES TO BE USED IN THE STUDY OF PHOSPHORUS CYCLING PROCESSES IN THE FYNBOS BIOME

Three aspects of phosphorus status and turn-over in Fynbos vegetation will be studied as follows:

1. Phosphorus levels (total phosphorus, Bray number 2 phosphorus and organic phosphorus) in the soil will be determined at various depths.
2. Phosphorus in the vegetation will be evaluated in two ways:
 - (a) analysis of specific Fynbos elements (e.g. ericoid, restioid and proteoid elements) at various stages of development;
 - (b) an area of vegetation will be cropped and evaluated for phosphorus.
3. Phosphorus turn-over will be studied in relation to the following:
 - (a) nutrient storage in the plant, i.e. levels of organic and inorganic phosphorus;
 - (b) mineralisation of insoluble phosphate, i.e. the activity of surface phosphatases which catalyse hydrolysis of insoluble organic phosphates;
 - (c) active absorption of nutrient from the soil, measured by the rate of uptake of ^{32}P -labelled compounds by mycorrhizal and proteoid roots.

Studies have commenced at sites in Kirstenbosch and Bain's Kloof and these results will be described. The techniques and units of expression of phosphate levels in the soil and plant material will be reviewed and compared.

JOOSTE, J.H. CHLORIEDOPNAME DEUR WORTEL-, BLAAR- EN BLOMWEEFSEL VAN PETUNIA

Die opname van Cl deur wortel-, blaar- en blomweefsel van Petunia is by twee temperature (30 en 2°C), met verskillende tydperke van opname en met en sonder 'n desorpsiebehandeling vergelyk. By alle behandelings is die hoogste opname met blomweefsel verkry. Dit is verder bevestig deur die opname van Cl deur die verskillende weefsels uit oplossings in die lae (0-1 mM) en hoë (1-50 mM) konsentrasiegebiede.

Die resultate bied 'n moontlike verklaring vir die waargenome effek van opgeloste stowwe op die hou vermoë van blomweefsel.

KRUGER, F.J. COMMENTS ON ALPINE PLANT FORMS IN THE FYNBOS

In an early paper on Cape fynbos R. Marloth listed and described several alpine plant forms found on Cape peaks exceeding about 1 800 m elevation. Recent visits to some of these peaks and others like them revealed that present-day vegetation is remarkable for relative poverty of alpine forms.

An analysis of early successional vegetation after a recent fire on Sneeuberg, Cedarberg Wilderness Area revealed a preponderance of alpine forms on the recent burn, compared with vegetation long unburnt.

It is suggested that alpine plant forms can grow and reproduce only in the exposed conditions of early successional communities on high fynbos peaks. Some of the dominant fynbos life forms are apparently well adapted to extreme environmental conditions, and suppress the alpine forms.

The implications of these observations with regard to biogeography and community ecology are examined briefly.

KRUGER, F.J. IMPACT OF FIRE ON NUTRIENT POOLS IN THE FYNBOS : A SPECULATIVE VIEW

Biomass data and nutrient concentrations in plant parts and in soils are used to indicate the size of nutrient pools in fynbos. Data from experimental burns and published sources provide a broad depiction of nutrient transfer during veld fires. A long-term record of precipitation inputs and dissolved solids outputs from experimental catchments provides a preliminary picture of nutrient balance in the ecosystem.

Research needs are assessed against this background.

KRUGER, F.J. & H.C. TAYLOR. CHANGES IN VEGETATION PHYSIOGNOMY ALONG AN ALTITUDINAL TRANSECT IN THE BRANDBERG, NAMIBIA

Plant communities in the Brandberg were sampled on a north-south transect for community structure. The changes found on this gradient are described and compared with similar gradients elsewhere in the world.

KRUGER, F.J. & H.C. TAYLOR. PLANT SPECIES DIVERSITY IN THE CAPE FYNBOS

The Cape fynbos is noted for exceptional richness in plant species.

In this paper we collate available data to illustrate levels of plant species richness in terms of alpha diversity, i.e. intra-community diversity, of beta diversity, or intercommunity diversity, and of other measures representative of florae of large elements of the landscape.

The results are compared with data from diverse biotas elsewhere, and certain lines of speculation regarding biogeography and ecology are explored.

KRUGER, G.H.J. & J.N. ELOFF. ONDERSOEK NA FAKTORE WAT 'N ROL SPEEL BY LIGSENSITWITEIT VAN MICROCYSTIS ONDER LABORATORIUMTOESTANDE

Dit kon aangedui word dat laboratoriumkulture van Microcystis besonder sensitief is teenoor lig. Om hierdie aspek te ondersoek is die verandering wat daar in die groeimedium van kulture by stremming en nie-stremmings ligintensiteite in parameters soos pH, CO₂-konsentrasie, O₂-konsentrasie, alkaliniteit, en bufferkapasiteit plaasvind, nagegaan. Uit die resultate het dit geblyk dat die CO₂-konsentrasie van die medium 'n belangrike rol speel tydens die liginhiberingsproses. Hierdie afleiding is bevestig in eksperimente waar Microcystis onder hoë ligintensiteite by verhoogde CO₂-konsentrasie gegroei is.

LUBKE, R.A. & S.C. SEAGRIEF. PROBLEMS INVOLVED IN THE ESTABLISHMENT OF PLANTS ON MOBILE COASTAL DUNES

Sand dunes provide one of the most unfavourable environments for plant germination, growth and establishment. Plants are subjected to alternating extremes of temperature, low moisture and nutrient availability, high light intensities, strong winds and shifting sands. In spite of these adverse conditions plants are able to colonize these areas and extensive reclamation programmes are underway to speed up the successional process and prevent mobile sand dunes from changing our coastline.

A review of the methods used in sand dune reclamation in South Africa will be discussed, with emphasis on the problems involved, the species of plants used and the success of the process. Some of the experimental work that may aid future reclamation programmes will be outlined.

MACDONALD, I.A. & N.W. PAMMENTER. REGENERATION OF A COASTAL DUNE FOREST FOLLOWING FIRE

A portion of the dune forest in the Mlalazi Nature Reserve, about 130 km north of Durban, was destroyed by fire in August 1975. Recently studies have been undertaken to follow the regeneration of this burnt area. Five 20m x 20m permanent quadrats were laid out in the burnt portion of the forest and a further five were situated in the neighbouring unburnt forest. Perennial woody vegetation was enumerated, basal areas were measured and estimates were made of the canopy structure. The composition and structure of the burnt area three years after the fire will be compared with that of the neighbouring mature forest. Results will be discussed in terms of the survival and growth strategies of the plants and concepts of succession. Technical difficulties associated with studies of this kind will be pointed out and their effects on the reliability of the results discussed.

MALAN, E. THE INTERRELATIONSHIPS OF THE METABOLITES FROM DISTEMONANTHUS BENTHAMIANUS BAILLON. THEIR POTENTIAL INTEREST IN THE BIOGENESIS OF PELTOGYNOIDS

Twelve flavones representing five different but related substitution patterns were isolated from the heartwood of D. benthamianus. A proposal as to how the substitution pattern results with reference to the B-ring and the molecule as a whole, and the preference for the O-methylation of certain groups is presented.

A novel peltogynoid which can be regarded as a 5,7,7',8'-tetrahydroxyl-6-O-methylchromono (3,2-3',4') isochromene (benthamianin) was also isolated and its relationship with the 3-O-methylflavones and distemonanthin was chemically established. From this relationship it is obvious that benthamianin is a key intermediate towards the formation of distemonanthin, irrespective whether this conversion was either enzymic or artificial?

MOFFETT, R.O. SARCOCAULON AND THE GARIEP : PRODUCTS OF A HOSTILE ENVIRONMENT

The speciation effects of the ancient Namib desert system have in the south, been enhanced by the complex geology and topography and microclimate of the Orange River mouth area.

Although extreme aridity, high diurnal fluctuations in temperature, continuous strong winds and rare deluges in this "Gariiep Centre" provide an environment distinctly hostile to man and most forms of plant life, these factors have promoted xerophytic speciation.

One of the many xerophytes with its centre of concentration in the "Gariiep" is Sarcocaulon (Geraniaceae). Of the 14 species in Southern Africa, 10 occur in the Gariiep, while 5 of these are endemic. These plants are able to thrive in the harsh conditions by having a fairly shallow widespread root system and an extremely durable, translucent, waxy bark which prevents waterloss.

MÜLLER, D.B. PLANTGEMEENSAPPE VAN DIE RANTEVELD IN DIE WILLEM PRETORIUS-WILDTUIN

Die plantegroei van die Willem Pretorius-wildtuin, geleë tussen Winburg en Ventersburg in die O.V.S., word ondersoek volgens die Braun-Blanquet-tagniek. Slegs die plantgemeenskappe wat voorkom op die rante word hier bespreek.

Die plantgemeenskappe van die rante kan in twee groepe verdeel word, nl. oorheersend grasveldgemeenskappe en boom- en struikveldgemeenskappe. Daar word nege verskillende plantgemeenskappe onderskei. Omgewingsfaktore wat die plantegroei beïnvloed, word ook kortliks bespreek.

OWER, J. & G.C. BATE. THE RESPONSE OF THE WATER HYACINTH EICHHORNIA CRASSIPES TO VARYING NUTRIENT AVAILABILITY

Water Hyacinth plants were cultured in a range of nutrient solutions containing different levels of nitrogen and phosphorus. Analyses revealed that growth rates were closely correlated to levels of nutrient in the culture solutions — high levels of phosphorus being inhibitory to growth. However, Water Hyacinth plants developed characteristic morphological features relating to the amount of leaf area, float area, degree of tillering and pigmentation according to the nutrient status of the nutrient solutions.

Chemical analysis of the tissue at the end of the growth analysis showed that there was no apparent accumulation of either of the two elements concerned in the floats as has been suggested previously. Overall N accumulation was found to be highest in the leaves in all cases, whereas distribution of P within the plant did not conform to a set pattern.

Using the results obtained, possible growth rates and nutrient utilisation by Eichhornia crassipes on N and P-polluted water is discussed.

PAMMENTER, N.W. ATMOSPHERIC AND SOIL SALINITY IN RELATION TO COASTAL DUNE SUCCESSION

The pattern of plant succession occurring across a dune profile in the Beachwood Mangroves Nature Reserve, Durban, was determined. Soil moisture, soil Na^+ and Cl^- and conductivity were measured on several occasions over a period of three months. Although minor differences across the profile were noted, it was considered that such changes were unlikely to be important factors in controlling the plant succession. The deposition of atmospheric salt on specially designed salt traps showed distinct horizontal and vertical changes across the profile, that correlated well with changes in vegetation. A series of survival studies involving dune shrubs demonstrated that salt spray could be considered to be a major factor determining their position in the succession.

PARKINSON, B.M. ASPECTS OF TAPETAL ORGANISATION IN PSILOTUM NUDUM (L.) BEAUV.

Investigations of spore wall formation during sporogenesis in P. nudum have necessarily involved observations of the tapetal tissue. This tissue does not appear to conform strictly to either of the two types of tapetal organisation which are generally recognised.

The tapetal tissue in P. nudum has been found to consist of a cellular layer, similar to the so called secretory type of tapetum which is parietal in position in the sporangium, and also a periplasmoidal component forming chambers in which the spores develop.

The parietal component appears to function in much the same way as the secretory type of tapetum found in many of the Angiospermae, with the development of a tapetal membrane. The periplasmoidal tapetum undergoes structural reorganisation during sporogenesis and structures similar to Ubisch bodies have been identified.

PIENAAR, R.N. PRELIMINARY STUDIES ON THE DEVELOPMENT OF FERN GAMETOPHYTES

Preliminary observations on the development of the gametophytes, of selected species of South African ferns, under controlled environmental conditions, are presented. Particular emphasis is placed on the early stages of gametophyte development, the development of antheridia and archegonia and the eventual development of the young sporophyte.

Observations on the ultrastructure of the development of antheridia and archegonia are also presented.

Some preliminary observations on the phenomenon of apogamy in the genus Pellaea will also be discussed.

PIENAAR, R.N. OBSERVATIONS ON THE PHYTOFLAGELLATE GENUS PYRAMIMONAS (PRASINOPHYCEAE) IN SOUTH AFRICA

Pyramimonas is a member of the class Prasinophyceae. The cells are characterised by being motile, possessing 4-8 apically inserted flagella. The cell surface is covered by three forms of body scales which are considered to be species specific. The surface of the flagella are covered by two types of scales as well as flagellar hairs.

Because of the small size of representatives of this genus the cells are studied with the aid of the electron microscope using heavy metal-shadowed and the conventional ultrathin section techniques.

Information concerning the marine and estuarine representatives of this genus collected off the East coast of South Africa are presented.

Comparisons are made with similar species that have been described from the Northern Hemisphere. Certain dissimilarities have been detected with respect to the scale architecture in Northern and Southern Hemisphere populations.

The results of these findings are discussed.

RAITT, L.M. & J.H. JOOSTE. STELLENBOSCH PLANTS REFLECT AIR POLLUTION GRADIENTS

Lichens are known to be sensitive to sulphur dioxide, and to a lesser degree to fluoride. Their distribution thus tends to reflect gradients of these pollutants. The lichen flora of the Stellenbosch oaks has been examined and the distribution of certain species has been noted.

Chasmanthe and Watsonia, from the same area, have been examined for fluoride pollution to supplement the lichen data.

RETIEF, E. DIE BELANGRIKHEID VAN 'N VRUG- EN SAADVERSAMELING

Die Angiospermae is vandag die dominante plantgroep op die aardbodem omdat die plantsoorte wat tot hierdie takson behoort ongunstige omstandighede in die natuur deur vrug- en saadvorming kon en kan oorleef. Daar is nog heelwat kennis aangaande die vrugte en sade van die inheemse flora van Suidelike Afrika wat ingewin moet word. Omdat dierkundiges, etnoloë, die boer en die geregsdienaar, byvoorbeeld, dikwels die korrekte identiteit van 'n vrug of saad in hulle nering benodig, terwyl morfoloë en taksonome dikwels nalaat om die vrugte en sade van 'n plantgroep te bestudeer weens 'n gebrek aan voldoende materiaal, is daar besluit dat dit belangrik is om die versameling van vrugte en sade van die Nasionale Herbarium verder uit te bou.

REY, M.E.C. & H.M. GARNETT. EVIDENCE FOR A VIRUS INFECTION IN BURKEA AFRICANA HOOK.

The appearance of necrotic spots on the leaves of Burkea africana Hook. at Nylsvley, and the distortion of some of the emergent leaves, seemed to suggest a possible infection by either a virus or mycoplasma-like organism. Consequently

transmission studies as well as light and electron microscopy have been used to determine the nature of the infection.

Virus-like particles and crystalline inclusions were observed in mesophyll cells. A large number of vesicles, absent in the cells of healthy leaves, were also noted. Other cytomorphological changes, suggestive of a virus infection, include disruption of the chloroplasts, presence of a number of vesicles and tubules associated with boundary formation, paramural bodies and abnormal cell wall deposits. Histochemical tests for callose deposition were negative but those for lignin were positive. Scanning electron microscopy demonstrated a collapse of the epidermal cells in the area of the lesion. Although the transmission studies have so far proved negative, there is considerable evidence for a possible virus infection.

RUSSELL, S. ENVIRONMENTAL TOLERANCE IN BRYOPHYTES

Due to their lack of a cuticle, Bryophytes are able to carry out gas and liquid exchange over most of their vegetative surface and can therefore be thought of, as living in more intimate contact with their environment than vascular plants. For this reason, many Mosses and Liverworts are sensitive indicators of micro-environmental conditions, although they may be poorly buffered against changes in these conditions.

Other Bryophyte species have broad tolerance limits and are fitted for life in so called "extreme" environments.

Examples are given, of South African Bryophytes that show morphological and physiological adaptations to a wide range of such habitat factors.

RUTHERFORD, M.C. ROOT SYSTEMS AND ROOT/SHOOT BIOMASS RATIOS IN *OCHNA PULCHRA*, AND SEASONAL ROOT TIP EXTENSION IN *BURKEA AFRICANA*-*OCHNA PULCHRA* SAVANNA

Biomass and distribution of more than 40 whole root systems of *Ochna pulchra* were determined using water under pressure for excavation. The root/shoot ratio for the entire sample set was 1,16 that is 54 per cent of the total plant mass occurred below ground. The root/shoot ratio of individual plants was, however, closely related to size of individual and was also strongly dependent upon the type of above ground growth form. Basic features of the lateral and vertical root distribution, clonal structures and the apparently negatively geotropic inverted root sub-systems are discussed. Seasonal root tip extension rates were determined for four soil profiles, each divided into four depth zones, using an *in situ* root observation chamber. Most of the seasonal root tip extension at depths below 25 cm occurred in late Summer and early Autumn. The timing of this growth is briefly contrasted with the timing of growth of above ground plant parts.

SHAUGHNESSY, G.L. HISTORICAL FACTORS IN THE SUCCESSFUL SPREAD OF CERTAIN ALIEN PLANTS NEAR CAPE TOWN

Thirteen species of exotic woody plants that are generally condemned as pests in the Cape were considered from an historical viewpoint. Manuscript materials in the Cape Archives were used in conjunction with published governmental and municipal reports to trace the introduction and spread of these species near Cape Town. It was established that some of these species were deliberately planted on a large scale over extended periods of time. Important reasons for this deliberate planting included: fascination with botanical novelties; experimentation to find useful plants; governmental encouragement to the public to grow trees and shrubs; afforestation and sand control programs; and production of tanning bark. On the other hand, for certain species (*Acacia longifolia*, *Albizia lophantha* and *Hakea sericea*) there is little evidence of widespread planting. This implies that their present-day distribution largely reflects their invasive capacity unaided by man. They may ultimately prove to be the worst pests.

SIMONS, R.H. IDENTIFYING RED ALGAE

Most Red Algae are marine and display several macroscopic phases during a complete life-cycle. The sexual phase is dioecious, the males and females appearing almost identical; the females, however, are often disfigured by warty outgrowths

called cystocarps that are, in fact, a parasitic asexual phase of the host-plant's life-cycle. In addition to the above three types is the tetrasporophyte, another asexual plant that reproduces through so-called tetraspores via a tetrasporangial tissue. The last-mentioned asexual phase most often has the same vegetative features as the sexual plants. Affinities among the Reds are primarily determined by the behaviour of the female reproductive organ, both before and after fertilization. Such features are very often missing in collected material. Vegetative characters can, however, be guides to identities and are in fact critical at specific and often generic or even higher levels in the hierarchy, especially if these are augmented with information on tetrasporophytes which, perhaps logically, are more common than the sexual plants. These criteria will be discussed in the light of my experiences with some South African examples.

SIMONS, R.H. THE INSHORE BIOTIC ZONE : A THREATENED ENVIRONMENT

The seashore is an area particularly sensitive to the effects of man.

For practical purposes the shore can be classified into supratidal, intertidal and subtidal zones. The supratidal areas are subjected to occasional inundation by the sea during storms, and are otherwise subject to sea-sprays carrying heavy loads of salt; the intertidal is to a varying degree partly terrestrial, while the subtidal is truly marine and characterised, in the South Africa context, by good mixing conditions. In each case these zones can be further classified into sandy and rocky terrains with intergrades. Yet another set of conditions arises naturally out of drainage off the land. Man's impact on the inshore zone is both direct and indirect.

Direct interference arises out of various types of exploitation, including bathing, and its results are perhaps easier to assess and to control than the indirect effects. As the latter are often less apparent and more subtly destructive, I intend to concentrate attention on these in this rapid review.

SMALL, J.G.C. RED AND BLUE LIGHT EFFECTS ON GERMINATION OF FAR RED AND THERMODYNAMIC LETTUCE SEED WITH SPECIAL REFERENCE TO ACTION SPECTRA

Fluence response curves for red light induced germination of thermodynamically dormant seeds of Lactuca sativa L. show two regions that differ in their light sensitivity. The curves for far red dormant seeds show only the low sensitivity responses. Similar effects were obtained with blue induced germination. Action spectra for induction are similar for low sensitivity responses but that for the high sensitivity response is significantly shifted to longer wavelengths.

The results are explained on the basis of different requirements for Pfr by the various response types rather than assuming different forms of phytochrome.

SMITH, V.R. MINERAL CYCLING STUDIES ON MARION ISLAND

Progress to date in the mineral cycling investigation in the island ecosystem is reported on. Emphasis is concentrated on the techniques and methods employed and on seasonal, spatial and diurnal variation in plant chemical composition. Input sources of minerals to the island terrestrial ecosystem are mentioned.

SOARES, I. & C.F. CRESSWELL. THE DISTRIBUTION OF NITRATE REDUCTASE IN ORGANELLES SEPARATED FROM LEAVES OF HORDEUM VULGARIS

The distribution of the enzyme nitrate reductase was studied in organelles isolated by means of a linear sucrose density gradient. Nitrate reductase activity and distribution was observed to vary depending on the presence or absence of Cleland's Reagent (DL - Dithiothreitol), a reagent normally incorporated to protect the enzyme from polyphenol inhibition during extraction. In the absence of dithiothreitol the bulk of the activity was in the supernatant fraction, and in the sucrose fractions between 25 and 30 per cent (w/w) sucrose. These fractions have been checked for organelles by means of electron microscopy. In the presence of dithiothreitol the activity was associated with the two chloroplast fractions and the mitochondrial fraction. The significance of the observed distribution of nitrate reductase will be discussed.

STEENKAMP, J. & O.T. DE VILLIERS. GASCHROMATIESE BEPALING VAN SURE VAN DIE KREBS-SIKLUS IN APPELS

Reeds bestaande gaschromatografiese metodes is aangepas vir die bepaling van organiese sure in appels. Die prosedure behels die gelyktydige ekstraksie en estrifikasie van droë plantmateriaal met 20 persent borontrifluoried-metanol kompleks oornag by 25°C. Die metielesters is geëkstraheer met chloroform wat die interne standaard (4-metoksie-metielbenoëlsuur) bevat. Voordat die chloroform-ekstrak vir die sure geanaliseer is, is ammoniumsulfaat by die mengsel gevoeg om die residuele borontrifluoried uit die organiese fase te verwyder.

TAYLOR, H.C. THE VEGETATION OF THE ROOIBERG, A DRY FYNBOS MOUNTAIN NEAR LADISMITH, CAPE

Because it is one of a series of fynbos inselbergs surrounded by karroid vegetation types, the Rooiberg range in the Little Karoo is of special phytogeographic interest.

To provide basic data for conservation management, the vegetation of Rooiberg State Forest was classified and mapped on a simple physiognomic system that could be used by personnel with no botanical training. The physiognomic classification was supplemented by 30 floristic relevés from which a phytosociological table was prepared.

The paper describes the vegetation units, shows how they relate to gross physiography and habitat, and compares some structural and floristic features of this type of mountain fynbos with those of other types in better known western areas.

Some thoughts on the conservation management of this reserve are expressed.

TEW, A.J. WATER UPTAKE BY MANGROVES

Work on the mangrove forests off the west coast of Florida, U.S.A., has shown that gross photosynthesis is sensitive to the terrestrial input of nutrients. The development of the mangrove tree biomass is therefore dependent on the quantity of nutrients and the efficiency of nutrient uptake rather than salinity as previously thought. This implies that salinity is a constant or that the mangrove is adapted to a variable salinity in the rooting medium and no leaf water stress is developed. Preliminary data from the Umgazana forests indicates that the salinity profile does vary with respect to fresh water input and tidal fluctuation. This paper presents the results of comparative study of the three mangrove species and the effect of varying salinity on the leaf water relations at varying radiation loads.

THERON, G.K., N. VAN ROOYEN & M.W. VAN ROOYEN. DIE PLANTEGROEI VAN DIE LAER KUISEBRIVIER

Die Kuisebrivier ontspring in die Khomas Hochland naby Windhoek en as gevolg van die relatiewe hoë reënval in die opvanggebied is dit een van die groot riviere in Suidwes-Afrika wat die Atlantiese Oseaan bereik, alhoewel dit maar baie selde tot by die see vloei. Groot hoeveelhede water word tans uit die laer Kuisebrivier, tussen Swartbank en Rooibank, vir dorps-, industriële en mynbou-ontwikkeling onttrek. Ten einde moontlike plantegroeiervanderings te monitor, was dit eerstens noodsaaklik om 'n plantegroeikaart van die laer Kuisebrivier saam te stel. Die plantegroeikaart strek vanaf Nareb tot by Rooibank. Fisionomies-strukturele eenhede is op 1:15 000 lugfoto's onderskei en in die veld vir homogeniteit en houtagtige spesiesamstelling nagegaan. Veertien plantgemeenskappe is onderskei en hulle is verder in variasies onderverdeel en in totaal is 40 gemeenskappe en variasies onderskei. Daar is verder ook vier eenhede met baie dooie kruidagtige soorte onderskei. Van die plantspesies wat veral opvallend is, is *Acacia albida*, *A. erioloba*, *Tamarix usneoides*, *Salvadora persica*, *Euclea pseudebenus* en *Acanthosicyos horrida*. 'n Aantal strookpersele en permanente kwadrate is in die gemeenskappe uitgeplaas waardeur kwantitatiewe gegewens van die plantegroei ingewin is.

THOMPSON, M.F. GENERIC DIFFERENCES IN THE HYPOXIDACEAE

Differences between the genera of the Hypoxidaceae with special reference to those occurring in the south western Cape are discussed with regard to rootstock, leaves, inflorescence, flowers, pollen and development.

VAN DE VENTER, H.A., B.H. WHITING & J.G.C. SMALL. FACTORS AFFECTING THE ROOTING OF ISOLATED JOINTS OF JOINTED CACTUS (OPUNTIA AURANTIACA)

Seeds produced by jointed cactus in South Africa are virtually all sterile. Propagation is therefore, entirely vegetative. Joints which become separated from the parent plant give rise to new plants after differentiation of roots and joints in their areoles.

Experiments were conducted to investigate some of the factors controlling rooting of isolated joints and the following appear to be involved:

- (a) polarity as induced by the parent plant
- (b) light
- (c) gravity

VAN DER WALT, J.J.A. & E.M. MARAIS. DIE TAKSONOMIESE WAARDE VAN DIE BLOM VAN PELARGONIUM

Met die laaste taksonomiese hersiening van Pelargonium het Knuth (1912) hoofsaaklik van habitus- en blaarkenmerke gebruik gemaak om die genus in 15 seksies te verdeel. Blomme van verteenwoordigers van elk van hierdie seksies word onderoek om die diagnostiese kenmerke en natuurlike verwantskappe van die taksons te bepaal.

Die algemene bou van die blom van Pelargonium word bespreek. Vervolgens word daar gewys op sekere variasies wat daar by verskillende spesies se blomme aangetref word. Voorlopige gevolgtrekkings oor die taksonomiese waarde van die blom word gemaak.

VAN RENSBURG, W.L.J. DIE INVLOED VAN FOSFAAT OP DIE GROEI VAN MICROCYSTIS AERUGINOSA

Baie van die binnelandse waters in damme is verryk ten opsigte van voedingstowwe, as gevolg van afvloeiwater vanaf rioolwerke wat in riviere beand. Dit blyk dat fosfaat 'n belangrike faktor in hierdie verrykte water is.

Onder natuurlike toestande kom Microcystis aeruginosa in hierdie eutrofe waters voor. Dit blyk ook dat die konsentrasie fosfaat 'n belangrike invloed het op die groei en opbloei van Microcystis in hierdie eutrofe waters.

Resultate in verband met die invloed van verskillende konsentrasies van fosfaat op die groei van Microcystis onder optimale laboratorium toestande in 'n voedingsmedium, sal bespreek word.

Die werk is gedoen op Microcystis aeruginosa (UV 006), 'n giftige blougroenalg afkomstig vanuit die Hartebeespoortdam.

VAN VUUREN, D.R.J. DIE SUID-AFRIKAANSE HOUTAGTIGE ADENIA-SOORTE EN 'N MOONTLIKE AANPASSING VAN LIANE BY 'N ONGUNSTIGE OMGEWING

Suid-Afrika is 'n betreklike droë land en oor groot dele van die land is die reënval nie net karig nie, maar ook wisselvallig. 'n Groot verskeidenheid van sukkulente plantsoorte kom dan ook in Suid-Afrika voor. 'n Besonder interessante groep sukkulente plante is die knolvormige stamsukkulente waar die hoofstam net bokant die grondoppervlakte knolvormig verdik is en sytakke wat uit die hoofstam ontspring, is gewoonlik rankend van aard. Die genus Adenia bevat in Suid-Afrika vier houtagtige verteenwoordigers, waarvan drie tipiese knolvormige stamsukkulente en een 'n groot houtagtige lian is. Inwendig-morfologies vertoon die stingels van al drie die stamsukkulente verteenwoordigers tipiese liane-kenmerke. Die knolvormige hoofstam word gevorm deur afwykende sekondêre diktegroei wat basies nie verskil van afwykende sekondêre diktegroei-tipes soos by sekere liane-soorte aangetref word nie. Dit wil voorkom asof die knolvormige stamsukkulente groeiwyse 'n aanpassing van die lian by droogte-toestande is.

VAN VUUREN, M.M. & J.N. ELOFF. INVLOED VAN HOË LIGINTENSITEIT EN LIKWALITEIT OP DIE GROEI VAN MYCROCYSTIS

Dit is gepostuleer dat foto-oksidase verantwoordelik is vir die afsterwing van Microcystis opbloei in die natuur. Verder is bevind dat laboratoriumkulture van Microcystis besonder liggevoelig is. Om hierdie aspekte te ondersoek is die invloed van hoë ligintensiteite onder verskillende omgewingstoestande sowel as die invloed van ligkwaliteit met behulp van interferensiefilters op die groei en pigmentsamestelling van Microcystis bepaal. Die aksiespektrum van liginhibering stem nie ooreen met die absorpsiespektrum van enige van die algemene pigmente wat in Microcystis voorkom nie. Verskille is ook aangetref tussen die reaksie van toksiese en nie-toksiese isolate van Microcystis.

VERHOEFEN, R.L. DIE INVLOED VAN LETALE KOPERKONSENTRASIES OP DIE ULTRASTRUKTUUR VAN MYCROCYSTIS AERUGINOSA

Koper is een van die spoorelemente wat noodsaaklik is vir die lewensproesse van die meeste plante en diere. By verhoogde konsentrasies is dit egter 'n algisied wat dikwels gebruik word vir die beheer van alge en blougroenalge soos Microcystis. Die toediening van letale koperkonsentrasies in die vorm van kopersulfaat, verlaag die groei en het ook ultrastrukturele veranderinge in die selle tot gevolg. Veranderinge in die sentroplasma, tilakoïede en ander sel insluitsels word bespreek.

VILJOEN, A.J. ENKELE ASPEKTE OMTRENT SUKSESSIE IN DIE SANDVELD-NATUURRESERVAAT

Die Sandveld-natuurreservaat is geleë in die oostelike varieteit van die Kalahari Doringveld noordwes van Hoopstad. Tydens 'n plantekologiese ondersoek in die reservaat is gevind dat groepies bome of boskolle as geïsoleerde gemeenskappe voorkom. 'n Opname van hierdie boomgroepe is volgens die Braun-Blanquet-metode gedoen en in verskillende gemeenskappe geklassifiseer. Daar is gevind dat die onderskeie boomgroep-gemeenskappe hoofsaaklik verskillende fases van suksessie verteenwoordig. Die oorsprong en suksessiepatroon van die boomgroep-gemeenskappe, asook enkele faktore wat dit beïnvloed, word beskou.

VON TEICHMAN, I. & P.J. ROBBERTSE. DIE ONTOGENIE EN MORFOLOGIE VAN DIE EKSTRAFLORALE NEKTARKLIERE VAN DIOSCOREA SYLVATICA ECKL. ASOOK DIE SAMESTELLING VAN DIE NEKTAR

Die verspreiding en habitate van Dioscorea sylvatica in Suid-Afrika en die ekonomiese belang van hierdie spesie word genoem. By D. sylvatica varieer die knol- en blaarvorm en grootte baie. Die ekstralorale nektarkliere is van die oppervlakkige soort en word op verskeie dele van die plant aangetref. Die kliere aan die abaksiale kant van die blaarskyf word beskryf. 'n Skede wat subepidermaal in oorsprong is skei die klierweefsel van die blaarmesofil. Dié klierweefsel is epidermaal in oorsprong. Die perifere laag klierselle toon veral in die radiale sehande 'n sterk lipied impregnering. Die sitoplasmarijke klierselle bevat besonder baie mitochondriums met opvallende groot kristale.

Goed gedifferensieerde diktiesome is daarenteen afwesig. Die oppervlakkige klierselle het 'n opvallend goed ontwikkelde ER. In die nektar kom daar blykbaar verskillende suikers voor, waaronder fruktose, glukose en sukrose. 'n Aantal aminosure kom moontlik in lae konsentrasies daarin voor.

WATTS, J.E. DIE MEGANISME VAN WERKING VAN 2,4,5-TP IN PACKHAM'S TRIUMPH PEERBOME

Die peer-cultivar Packham's Triumph lewer, ten spyte van goeie blomvorming en optimale kruisbestuiving onbevrugte ooste. Bespuiting met $7,5 \text{ mg l}^{-1}$ 2,4,5-TP [(2,4,5-trichlorofenoksi)-propioënsuur] gedurende die herfs verhoog die vrugset betekenisvol. Baie min is tans bekend oor die meganisme waardeur 2,4,5-TP in hierdie geval werksaam is. Die aanname word gemaak dat dit tweeërlei mag wees nl. óf 'n direkte effek op vrugset deur 'n verandering van nukleien-suur- en proteïenmetabolisme (waardeur ensieme in die afsnydingslaag van vrugsetkies beïnvloed sou kon word), óf 'n indirekte effek deur 'n verhoging van mobilisasie van voedingstowwe na vruggies.

Die is aangetoon dat 2,4,5-TP-bespuittings 'n invloed het op:

- (a) die inkorporering van leusien- ^{14}C in proteïen en oortlensuur- ^{14}C in RNA en
- (b) die totale RNA-gehalte van beide blaar- en vrugweefsel.

Die bespuittings het geen betekenisvolle invloed gehad op die konsentrasie stysel en vrye suikers in blare, lote of vruggies nie.

WHITING, B.H., H.A. VAN DE VENTER & J.G.C. SMALL. THE EFFECT OF POTASSIUM HEXAFLUOROARSENATE ON SELECTED ASPECTS OF CRASSULACEAN ACID METABOLISM IN JOINTED CACTUS (OPUNTIA AURANTIACA, LINDLEY)

Jointed cactus is shown to possess the characteristics of Crassulacean Acid Metabolism (CAM) under controlled conditions. These observations are supported by carbon isotope discrimination ratios (-11.1 to -14.6) of plants found growing under natural conditions. The effects of sublethal rates (2 kg ha^{-1}) of hexaflurate, a selective herbicide registered for use on Eriocereus martinii Lab. Ricc. in Queensland, on selected aspects of crassulacean acid metabolism will be discussed.

WILTSHIRE, G.H. MINERAL CYCLING IN FIVE GRASSLAND TYPES IN THE WILLEM PRETORIUS GAME RESERVE

The problem of computing mineral uptake into the available above-ground biomass from analyses made on serial clippings is discussed.

Measurements of uptakes of N, P, K, Ca and Mg in the five main grassland types in the Willem Pretorius Game Reserve showed that uptakes of N agreed closely with expectation from measurement of the mineral + mineralisable nitrogen in the soils, whereas uptakes of P were about one third of the bicarbonate-extractable phosphate and uptakes of the three cations were very much smaller than the exchangeable amounts in the soils.

NOTES/AANTEKENINGE