

Bibliography, PORTUGAL

Ana Ferreira de Almeida

Soares Barreto L. (1993): UMBRELLA. A First Simulator for Self-Thinned Even-Aged Pure Stands of Umbrella Pine

Silva Lusitana 1 (2), 157-162

Abstract: Referring to the results of his theoretical research, the author presents simulator UMBRELLA, which for self-thinned even-aged pure stands of umbrella pine (*Pinus pinea*) establishes: a) a classical yield table, b) a biomass table. The program listing of simulator UMBRELLA (written in BASIC) and a sample of its output are presented. A quick algorithm to calculate the yield table, using a pocket calculator, of a self-thinned even aged pure stand of umbrella pine is also introduced.

Key-words: Biomass table, *Pinus pinea*, self-thinned even-aged pure stands, simulator, yield table

da Costa Seabra r., Salomé Pais M. (1993): Micropropagation of Chestnut (*Castanea sativa* Mill.) Clones Resistant to Ink Disease (Micropropagação de Clones de Castanheiro (*Castanea sativa* Mill.) Resistentes à Doença da Tinta)

Silva Lusitana 1 (2), 169-181

Abstract: In vitro plantlet regeneration and weaning of resistant clones of *Castanea sativa* Mill., was established. The mass propagation of chestnut plants resistant to ink disease is necessary for the reforestation of infected areas.

Key-words: In vitro culture, weaning, chestnut

Sousa E., Debouzie D. (1993): Contribution to the Knowledge of Some Silvicultural and Ecological Variables Related to the *Coleopter Platypus cylindrus* F., a Pest of the Cork Oak in Portugal (Contribution à la Connaissance de Quelques Variables Sylvicoles et Écologiques Associées au Coléoptère *Platypus cylindrus* F., Ravageur du Chêne Liège au Portugal)

Silva Lusitana 1 (2), 183-197

Abstract: Among several biotic agents, the insect *Platypus cylindrus* F. (Coleoptera: Platypodidae) has been assumed to be directly implicated in the decline of the cork oak in Portugal, but its real effects are not well documented. The present work relates the observations made in 1992 and 1993 in field essays done in natural stands of cork oak in the Coruche area (Portugal). Host selection by *P. cylindrus* mainly depends on several factors: the site (geomorphology), the stand (density and spacing), the trees (growth, weakness, presence of other biotic agents) and on the silvicultural methods. A risk of attack, based on four variables most directly related to the attacks, allows us to estimate which tree will be infested by the insect in the following year.

P. cylindrus should be considered a secondary pest of cork oak, attacking primarily the highest trees, ones which have been recently decorticated and probably wounded by cork removal.

Key-words: Cork oak decline, *Platypus cylindrus* F., host selection

Capelo J. H., Ferreira de Almeida A. (1993): Data on the Vegetation Cover of Arrábida Natural Park: a Proposal of Phytosociological Typology (Dados sobre a Paisagem Vegetal do Parque Natural da Serra da Arrábida: Proposta de uma Tipologia Fitossociológica)

Silva Lusitana 1 (2), 217-236

Abstract: The Arrábida Natural Park is a small limestone outcrop, which has a plant cover unique in the Western Mediterranean Region. The assessment of the elementary landscape units (tessellary or mosaic units) for general purpose and goal-oriented cartography should be based on a more ecologically meaningful typology than mere plant physiognomy. The proposed phytosociological typology covers the most significant vegetation classes in the Park. Moreover, special

attention is given to the Kermes Oak (*Quercus coccifera* L.) communities which are the most conspicuous communities in the landscape of Arrábida, and conversely the most difficult to distinguish merely by physiognomic features. A floristic delimitation of three *Q. coccifera* communities was achieved by the classification of 35 vegetation relevees using TWINSpan.

A new name, *Arisaro simorrhini-Quercetum broteroi aceretosum monspessulani*, subass. nov., is proposed.

Key-words: Arrábida, limestone vegetation, phytosociology

Fernandes P.A., Pereira J.P. (1993): Fuel Characterisation of Serra da Arrábida (Caracterização de Combustíveis na Serra da Arrábida)

Silva Lusitana 1 (2), 237-260

Abstract: Particles' surface to volume ratios and aerial biomass characteristics (load, class partition, continuity) were studied for Arrábida's main shrub species. Biomass prediction models from biovolume were established. The species were then rated according to their potential fire risk, a high risk is associated with *Ulex densus*, *Erica arborea*, *Rosmarinus officinalis*, *Juniperus phoenicea* and *Quercus coccifera*. Fuel loads of the communities as well as vegetation height and cover were the basis to identify eight situations for the development of fuel models. This was accomplished using the fuel modelling and fire behaviour simulation system BEHAVE.

Key-words: Arrábida, BEHAVE, biomass, fire behaviour, fuel models, shrubs, surface to volume ratios

Soares Barreto L. (1994): The Clarification of the 3/2 Power Law Using Simulators Sandris and Pinaster

Silva Lusitana 2 (1), 17-30

Abstract: The author presents the simulator PINASTER for pure even-aged self-thinned stands (age equal or greater than 10 years) of Maritime pine (*Pinus pinaster* Ait.) Allometric equations for the biomass components of trees of Maritime pine are proposed. Using these allometric relationships and model KHABA, simulator PINASTER establishes the stand biomasses of needles, live branches, dead branches, stem wood, stem bark, roots and an estimation of the standing volume. For these components, their contents in N, P, K, Ca, Mg, Na are also estimated. Depending on the available information, optionally, the simulator can also establish the classical yield table of the same stand. The minimum input required is stand age, density and mean tree DBH. The simulator is described and evaluated. A program listing, written in BASIC, of simulator PINASTER and a sample of its output are also presented. The value of the power in the so called 3/2 power law is scrutinized. This power is equal to 3/2 only if the stem biomass (or volume) is being considered. For the biomasses of the crown components of the mean tree the power is 1. For the biomasses of the roots, above ground and total mean tree, the power is between 1 and 3/2. The truth content of the theory established by the author for self-thinned pure stands is also commented.

Key-words: Biomass table, nutrient table, *Pinus pinaster*, 3/2 power law, simulator, yield table

Ferreira de Almeida A, Rego F.C., Alcoforado M.J., Capelo, J (1994): Fire Behaviour Prediction in Serra da Arrábida: Reality and Simulation (Previsão do Comportamento do Fogo na Arrábida: a Realidade e a Simulação)

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Silva Lusitana 2 (1), 41-49

Abstract: We used a fire behavior prediction system (BEHAVE) as well as the fuel models that seemed to fit Arrábida's vegetation, together with the weather data collected during the fire of

September 1991. The predicted burned area was compared with the area that actually burned. We concluded that the fuel model specifically created for Arrábida yielded better results.

Key-words: Fire behavior modelling, fuel models

Costa J.C., Espírito Santo M.D., Lousã M. (1994): The Vegetation of Dunes of Southwest Portugal
Silva Lusitana 2 (1), 51-68

Abstract: The Natural Protected Landscape of the southwestern coast of Portugal is composed essentially of three different regions. In this work several important dune communities and their syntaxonomy were described. We propose the new association: *Stipo giganteae-Stauracanthetum vicentini* and a new subassociation: *Herniario algarvicae-Linarietum ficalhoanae chaenorrhinietosum lusitanicae*. A list of the plants which have a special status is also presented.

Key-words: Dunes, lithified calcareous dunes, phytosociology, Sagres Peninsula, vegetation

da Silva Carvalho J (1994): Perspectives of Chemical-Technological Evaluation of *Rosmarinus officinalis* L. (Perspectivas de Valia Químico-Tecnológica Integrada da *Rosmarinus officinalis* L.)

Silva Lusitana 2 (1), 127-130

Abstract: The essential oil from this spontaneous fragrant shrub is particularly rich in the following components: β -myrcene, 1-8 cineol, p-cimene and canphor (or linalool). The global extract yield from two distinct sites is very different, such as 0.6 to 1.1 % of the estimated dried branch mass. The most advanced extraction for some components, like cineol, may be achieved by adding some n-hexane or ciclo -hexane to the mass before vapor distillation.

This analytical study suggests the viability for a whole chemical utilization of the biomass, by extracting the actual polyphenolic tanning material after the extraction of the essential oil, etc.

Key-words: β -myrcene, 1-8 cineol, p-cimene, polyphenolics, tanning

Vasconcelos T.M., da Gama M.M., Sousa J.P. (1994): Comparative Study on Collembols Biodiversity of Maritime Pine and Eucalyptus Stands (Estudo Comparativo da Biodiversidade Colembológica em Povoamentos de Pinheiro Bravo e de Eucalipto)

Silva Lusitana 2 (2), 179-191

Abstract: The authors have studied the effects of reafforestation with *Eucalyptus globulus* Labill., on the edaphic Collembola by means of agglomerative cluster analysis applied to the study of Collembola populations occurring in *Eucalyptus globulus* and *Pinus pinaster* Aiton, plantations.

This analysis revealed that the populations from eucalyptys are richer in species, namely in exclusive species, than those from pine plantations. However, among the species inhabiting both biotopes, the number of preferential species and the total number of individuals is higher in pine plantations.

Key-words: Collembola, species diversity, *Pinus pinaster*, *Eucalyptus globulus*

da Silva Carvalho J. (1994) Fragrant Quality and Potentialities of Spontaneous Shrubs from Serra de Aire e Candeeiros (Qualidade FrAGRANTE e Potencialidades de Arbustivas Espontâneas das Serras de Aire e Candeeiros)

Silva Lusitana 2 (2), 193-206

Abstract: The main objective of work was to obtain the chemical analysis of the essential oils coming from some fragrant shrub species largely spontaneous in Portugal, such as the *Thymus*, *Lavandula* and *Rosmarinus*, and also few other cases such as *Mentha*, *Calamintha*, etc., from gas chromatography analysis. For the majority of these shrubs, their branches were collected for extraction and analysis, from the same and different sites and times.

After about thirty compounds had been identified for each species and after an examination of the most characteristic of each of the species, it was found that there was a huge degree of variation in the composition thereof on a case by case basis suggesting the need to selected and clone the better quality species.

Key-words: Fragrants, essencial oils, thymol, carvacrol, β - myrcene, 1-8 cineol, camphor

Soares Barreto L. (1994): The Dynamics of the Biomass of Maritime Pine Trees and Stands
Silva Lusitana 2 (2), 239-246

Abstract: The author uses simulator PINASTER, that he had established before, to scrutinize the dynamics of the biomasses of Maritime pine (*Pinus pinaster*) trees and stands. He proposes Gompertz models for the dynamics of the total biomass and for the biomasses of the stem wood, stem bark and roots of self-thinned pure even-aged stands of this pine. Also, Gompertz models are proposed for the dynamics of the biomasses of the tree components. The simulator and the Gompertz models are used to analyse the pattern of the biomass dynamics of the same stands of Maritime pine. The architecture of Maritime pine trees is also approached. The author proposes indexes for stand density, stocking and tree size.

Key-words: Bionomic strategy, models for the biomass dynamics, *Pinus pinaster*, tree architecture

von Wuehlisch G., Nóbrega F. (1995): Inheritance of Isoenzyme-Locus PGI-B in *Quercus suber* L.
Silva Lusitana 3 (1), 1-6

Abstract: The variation and inheritance of the isoenzyme locus PGI-B in 29 plus trees of cork oak (*Quercus suber* L.) has been demonstrated. The three tissue types under analysis - bud, root tip, in addition to pollen gave identical banding patterns. Three allozymes were found to code for PGI-B, resulting in a fast, an intermediate, and a slowly migrating band with a frequency of about 0.7, 0.29, and a low frequency of about 0.01 respectively.

Key-words: Isoenzyme, PGI-B, *Quercus suber*

Sousa Santos M.N. (1995): A Poplar Fusariosis in Portugal (Uma Fusariose do Choupo em Portugal)
Silva Lusitana 3 (1), 17-22

Abstract: In the course of surveys carried out in poplar stands, a fusariosis on *Populus x euroamericana* (Dode) Guinier cv 'I-214', and *Populus* sp. was detected in Portugal for the first time. *Fusarium avenaceum* (Fr.) Sacc. was later identified as the causal agent. The teleomorph *Gibberella avenacea* Cook was also detected on these hosts. The serious damages observed are probably in connection with the unfavourable growing conditions of the affected trees.

Key-words: Poplar, *Fusarium avenaceum*

Saporiti Machado J. (1995): Visual Strength Grading - Application to Maritime Pine Timber
Silva Lusitana 3 (2), 163-171

Abstract: The possibility of using a particular timber for structural purposes, according to Euro-code 5, depends on the existence of a strength grading system adjusted to the species in question. The results of the application of different strength grading systems to maritime pine timber (*Pinus pinaster* Ait.) have therefore been analysed with the objective of selecting the most suitable system.

Three of the various systems tested are currently in use in Europe and the other two have been developed on the basis of the results obtained from the application of the former systems. Six selection criteria which makes it possible to predict the applicability of each system from a technical viewpoint were used in the comparison.

The results obtained show that the system specified in Portuguese Standard NP4305 is the most suitable for grading maritime pine timber for structural purposes.

Key-words: Timber structures, mechanical properties, bending strength

Rego F.C., Castel Branco da Silveira S., Cardoso Gonçalves P.C., Fernandes Lousã M.F. (1995): Distribution Analysis of Flora Species of Natural Reserve of Serra da Malcata (Análise da Distribuição das Espécies Vegetais da Reserva Natural da Serra da Malcata) *Silva Lusitana* 3 (2), 229-236

Abstract: The application of the "Detrended Correspondence Analysis" ordination technique to the data on the composition of species collected between 1986 and 1990 at the Serra da Malcata Nature Reserve has permitted the authors to summarise, structure and graphically represent the existing interspecific relationships.

This type of indirect gradient analysis investigates the main variations in floristic data and compares it with the consideration of ecological factors.

The results obtained permit to identify species with similar ecological needs and behavior and emphasises the importance of water availability in their distribution.

Key-words: Flora, ordination, Detrended Correspondence Analysis

de Fátima Moniz M., Tomaz I.L., Cabral M.T. Basto M.S. (1996): Patogenicity Evaluation of *Phytophthora cinnamomi* Rands in Cork Oak (*Quercus suber* L.) (Avaliação da Patogenicidade de *Phytophthora cinnamomi* Rands em Sobreiro (*Quercus suber* L.)) *Silva Lusitana* 4 (1), 79-88

Abstract: It has been suggested that cork oak and other quercinaea decline is related with pests and disease occurrence. Several Spanish and Portuguese researchers have referred to the probable importance of *Phytophthora cinnamomi* Rands in this process. Although the fungus has been isolated from cork oak, the pathogenicity thereof has not been proved in this respect.

For a better understanding of the relations *P. cinnamomi*/cork oak we carried out several suitably designed experiments using different modes (isolations x substrates x inoculation types x plant ages). The pathogenicity of those cultures was proved by inoculation on chestnuts, which is highly susceptible to this fungus.

Daily observations were made for 3 weeks and daily observations made every 1 to 2 months observations for observing the symptoms, mortality and finally the re-isolation of the fungus. After 15 days 100% of the chestnut trees had died, and the fungus was re-isolated although there were no cork oak deaths.

Key-words: *Phytophthora cinnamomi*, cork oak, chestnut

de Castro Antunes J.H.S. (1996): Syn-phytosociological Aspects of Serra de S. Mamede (Aspectos Sinfitossociológicos da Serra de S. Mamede) *Silva Lusitana* 4 (1), 97-107

Abstract: A phytosociological and environmental survey has been carried out on the principal plant communities belonging to the *Quercus pyrenaica* Willd. vegetation series in the Luso-Estremadurensis Province. Two new sintaxa have been submitted: *Cytisetum multifloro-eriocarpi genistetosum falcatae*, subass. nova and *Halimio umbellati-Ulicetum minoris*, ass. nova.

Key-words: *Quercus pyrenaica*, phytosociology, syn-phytosociology, S. Mamede

Goreti de Sampaio Pinto M. (1996): Volume Tables for *Betula* sp., *Castanea crenata*, *Quercus robur* and *Quercus rubra* at Entre-Douro-e-Minho (Tabelas de Volume de Simples Entrada para *Betula* sp., *Castanea crenata*, *Quercus robur* e *Quercus rubra* no Entre-Douro-e-Minho) *Silva Lusitana* 4 (2), 171-183

Abstract: Based on data collected from temporary sampling plots located in the Forestry Areas of Serra da Cabreira, Senhora da Abadia and Entre Vez e Coura, local volume tables for *Betula* sp., *Castanea crenata*, *Quercus robur* and *Quercus rubra* have been prepared. The volume estimate was obtained using the Pressler-Bitterlich method

Key-words: Standing tree, volume over bark, volume under bark

Figueiredo J.P., Valente de Almeida V. (1996): *Pinus pinaster* Ait. Annual Circumference Growth Pattern for the Coastal Dunes – Aveiro Region (Ritmo Anual de Crescimento em Circunferência da *Pinus pinaster* Ait. Nas Dunas do Litoral – Região de Aveiro)

Silva Lusitana 4 (2), 243-249

Abstract: The annual pattern (1992) of circumference growth was studied from an ecophysiological perspective in a *Pinus pinaster* stand located on coastal sand dunes in the Aveiro region. The site enjoys a Mediterranean type climate with a marked Atlantic influence. Soils consist of poorly developed eolic quartz sands with variable podzolization.

This study emphasizes the effect of environmental factors - temperature, photoperiod, humidity - on the diameter growth pattern.

Key-words: Circumference growth, temperature, photoperiod, humidity

Sande Silva J., Rego F.C. (1997): Establishment of Mediterranean Woody Species After Fire in Central Portugal

Silva Lusitana 5 (2), 193-209

Abstract: Mediterranean woody species use different regeneration strategies after fire outbreaks. The establishing of new seedlings varies in line with the regeneration strategies of the different groups of species. A set of 40 transects was used in two regions of Central Portugal in order to collect information on the establishing of seedlings at different post fire outbreak stages, using a synchronical sampling method. Specific criteria has been proposed and used for classifying transects/studying sites in successional stages. Owing to the fact that seedling recruitment varies considerably in the different successional stages of the plant community after fire outbreaks, the analysis has been carried out in line with the transect classification. The correctness of this classification has been verified performing a cluster analysis on different transects as a whole. The resulting species diversity has also been analysed and compared vis-à-vis the different successional stages considered. The analysis of different species frequency basically certifies the thesis of other authors. Obligate seeders such as the *Cistus* species recruit new individuals at early stages after fire outbreaks whereas typical obligate resprouters such as *Arbustus unedo* or *Quercus coccifera* only tend to establish new seedlings during the latter succession stages.

Key-words: Fire, mediterranean vegetation, Portugal, seedling establishment, successional stages, diversity

de Macedo F.W. (1997): Remote Sensing of Forest Resources in Portugal: Reality and Perspectives (Deteccção Remota de Recursos Florestais em Portugal: Realidades e Perspectivas)

Silva Lusitana 5 (2), 257-273

Abstract: After providing an overview of the composition and economic value of forest resources in Portugal, several associated problems such as forest fires have been referred to. Suggestions have been made for the use of several technologies, such as remote sensing and geographical information systems for the study and management of these resources. Reference has also been made to several difficulties which have had a delaying effect on the diffusion and better use of such technologies out and several suggestions have been made for increasing their application.

Key-words: Remote sensing, geographical information systems, forest survey, forest management

Clemente A.S., Rego F.C., Correia O.A. (1996): Demographic Patterns and Productivity of Post-fire Regeneration in Portuguese Mediterranean Maquis

Int. J. Wildland Fire 6 (1), 5-12

Abstract: After a wildfire in September, 1991, post-fire regeneration of Serra da Arrábida maquis was studied and compared to an adjacent 30-yr-old unburned site. Two years after fire, cover and aboveground biomass was half of the amount found in unburned stands. This rapid recovery was

mainly due to resprouting species: *Q. coccifera* was dominant during all stages of regeneration. Herbaceous species were abundant during the first two years after fire but became scarce in older communities. Obligate seeders showed different patterns of recovery: *Cistus* species established many seedlings immediately after fire, but were less abundant in older stands, *Rosmarinus officinalis* attained high dominance in unburned sites but seedling recruitment was delayed, yet continuous during post-fire succession. This difference between two genera with the same obligate seeding strategy suggests that life history responses to environment factors may affect or shape species distribution during the post-fire regeneration.

Key-words: Biomass, cover, density, obligate seeders, resprouters, Serra da Arrábida

Gomes Pedro J. (1991): Vegetation and Flora of Arrábida (Vegetação e Flora da Arrábida) Col. Natureza e Paisagem Nº10, 131 pp.

Abstract: The present work divides into four chapters: Physiography, Biophysics, Vegetation and Flora. Although it mainly deals with the vegetation and flora of Arrábida, we can not help referring the morphological characteristics and the climatical conditions of the mountain range, taking into account its diversity and in order to facilitate the discription, we have to consider the orographic division into three sectors.

We have also treated, though in abbreviated form, the floristic composition of the different formations from the rupestrian to the woodlands, indicating their botanical designations, whenever known, by their vernacular names.

Key-words: Arrábida, flora, vegetation