

# Reviews

**Economic nematology.** J. M. Webster (ed.), Academic Press, London and New York, 563 p. 1972. £8.50 (c. \$21.25).

The only encounter most Chronicle readers have had with nematodes (phylum Nemathelminthes, class Nematoda) was in introductory zoology, where they peered through a microscope at a drop of vinegar scum and viewed the small, wiggly, vinegar eel-worm, or examined *Trichina* worm cysts in a section of muscle from some unfortunate individual who had eaten pork not thoroughly cooked. Readers may also recall that human and animal parasitic nematodes fall under the domain of helminthology while nematologists study water- and soil-inhabiting nematodes. Among the latter are the plant-parasitic nematodes which may or may not enter and feed on above- or below-ground plant parts. They are typically microscopic (0.5 to 4 mm long; 0.05 to 0.25 mm wide), transparent, egg-laying, worm-like animals which feed by piercing plant cells with a spear-like stylet and withdrawing the cell contents. Feeding is frequently accompanied by introduction of enzymes or growth altering substances which cause abnormal growth or necrosis; root rot fungi and bacteria may enter through feeding wounds. Shoot symptoms include stunting and chlorosis and are often confused with unfavorable soil nutritional or physical factors.

Certain nematodes may transmit plant-pathogenic viruses while others may destroy or prevent mycorrhizal formation. Although usually thought of as mainly row-crop pests, nematodes also contribute to tree root rot, replant, and decline problems, and they frequently damage forest nursery seedlings. The recent advent and use of soil fumigants, nematode resistant plants, and modified cultural practices have been important in showing the detrimental effects of nematodes to plant health.

Although numerous books and periodicals are available on subjects ranging from nematode taxonomy to physiology, little is known about the economic losses caused by nematodes. The purpose of **Economic Nematology** is to rectify this situation. Dr. John Webster, of Simon Fraser University, has brought together and edited the contributions of 20 authors, mostly nematologists, from several countries.

The introductory chapter by M. H. Kahn deals with some basic economic principles relating to crop losses and disease control. In the following 17 chapters, individual authors cover the nematode problems of single or related crops ranging from bananas to mushrooms. Chapter 14, **Nematode Problems of Forest Trees**, by J. L. Ruehle, will interest forest managers and scientists. Ruehle emphasises that the importance of certain soil-borne pathogens such as nematodes will increase as forest management is intensified to meet increasing wood demands. He discusses various nematode-tree associations such as nematodes parasitic on tree insects and parasitic nematodes which inhabit the rhizosphere. Included are nematodes which feed on mycorrhizal fungi and those that feed directly on roots. There follows three sections on specific nematode diseases, their effect on tree growth, and their control in nurseries, plantations and natural stands. Lastly, he estimates that nematodes cause a \$5 million loss in mean annual growth increment in the U.S.A. The last two chapters, 19 and 20, are by editor Webster and M. Oostenbrink. Webster's chapter includes sections on the use of various biological agents to control plant-parasitic nematodes, and the control of insects by parasitic nematodes. Oostenbrink writes on the **Evaluation and Integration of Nematode Control Methods**. He discusses nematode density-plant yield relationships, application of population figures to control, and evaluates 10 main nematode control methods, e.g. quarantines and crop rotation. He illustrates (page 508) a useful

concept relating a soil fumigant's boiling point to its potential phytotoxicity.

Considering that 20 authors contributed to **Economic Nematology**, its form and style are remarkably uniform; typographical and other errors are rare and the illustrations are clear and well chosen. Author and subject indexes are included. Undoubtedly printing costs prohibited the inclusion of reference titles.

Most foresters will probably not buy the book because of its very specific contents, but they would find it interesting and informative reading.

Jack R. Sutherland

**Planting av gran på grasbundet mark** (Planting experiments with Norway spruce on grass-covered land). Martin Haugberg. Norwegian Forest Research Institute, Meddelser fra Det Norske Skogsforsøksvesen no. 115, Vol. 29(6): 297-460. 1971.

How refreshing it is to discover that, at least in Norway, a silviculturist can command support for an intensive program of research sustained over a period long enough to produce results of predictive value, especially when the support extends to publication of the results in a well argued, fully documented account of real value to the practitioner. This book will not appeal to a wide audience, but to anyone concerned with forestation of grassland it will be invaluable. Although the text is in Norwegian, the 7-page English summary and English headings to all 50 tables make virtually the whole intelligible to those who read English only.

The studies reported here include 14 field trials of 9 planting methods and 18 additional experiments. Some 30,000 trees were used in this work, and data were collected from most of the main experiments for 8 to 10 years after planting. The main areas of investigation were: planting methods; weed control; mulching (with tarred paper); fertilizing; watering; pre-planting

plowing; and grades of planting stock. Conclusions are summarized (Chapter IX) under the following headings: Planting costs for different planting methods; Effect of planting method and soil cultivation on plant survival and growth; Effect of weed control; Effect of planting stock quality (nursery grades); Soil physical conditions and spruce nutrition.

Silvicultural aspects are covered thoroughly, physiology and nutrition in a supplementary fashion only. The results and inferences to be drawn from these excellent studies relate directly mainly to spruce forestation of grassland. But within this circumscription, the wealth of information will repay careful study by regeneration silviculturists.

R. F. Sutton

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**Annual Report 1971, (U.K.). Agricultural Research Council, Letcombe Laboratory.** Her Majesty's Stationary Office, 49 High Holburn, London WC IV 6 HB, England. 63 p. 1972. £0.67 (= \$1.67).

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"The major part of the Laboratory's programme... continues to be... the study of the growth and function of plant root systems, especially in relation to soil factors which (sic) affect the productivity of crops". Under the leadership of Director Dr. R. Scott Russell and Deputy Director E. R. Mercer, the Laboratory is making an impressive contribution in this field.

Being agriculturally oriented, the work is not directly applicable to forestry. But principles do not respect interdisciplinary boundaries, and many of the results coming out of Letcombe will apply to forestry, albeit indirectly. The techniques of investigation developed at the laboratory will also find application in forestry.

The report is divided into Part I, in which 1971 investigations are described, and Part II in which two topics that have been under investigation for several years are reviewed in detail. This very useful approach might well be adopted by other research organizations in their annual reports.

The scope of the work is suggested by the section headings and subheadings of Part I: Plant root systems and their relationship to the soil — Physiology of nutrient uptake — Response of root systems to stress — Ethylene in anaerobic soil — Behaviour of nutrients in the soil — Field studies of crop growth in relation to soil physical conditions; Studies of herbicides which (sic) are applied to the soil — Soil aspects — Plant aspects; Radioactivity in human diet, 1971; Analytical chemistry and electronics sections; The Letcombe Laboratory/Weed Research Organization joint statistics section.

One of the interesting findings emanating from the physiological studies of the uptake of nutrients by the root systems of intact plants is that "in marrow, as in barley, absorption and translocation of potassium and phosphorus are not restricted to an 'absorbing zone' consisting of expanding or maturing cells near the root tip." Also, "techniques for the autoradiography of diffusible ions are now sufficiently standardized to permit quantitative measurement of the concentration of tracer-labelled material within tissues from auto-radiographs."

The importance of micro-organisms in relation to nutrient uptake has not yet been generally recognized. This field is under active investigation at Letcombe. In the 1969 annual report, evidence was presented to show that the uptake and translocation of iron and zinc supplied either as inorganic salts or as chelates with ethylene-diaminetetraacetic acid (EDTA) were enhanced in the presence of micro-organisms. The 1971 report now shows that manganese uptake is similarly enhanced. "Further, it appears that, irrespective of the presence or absence of micro-organisms, manganese supplied as the EDTA chelate is absorbed at up to fifty times the rate of the organic moiety; this suggests that the chelate is broken down at the surface of the root."

In addition to its work on plant-soil relationships, Letcombe carries out research on weeds and herbicides in collaboration with

the Weed Research Organization. A project that silviculturists will follow with interest was initiated in 1970 to study factors affecting the efficiency of soil-applied herbicides and to determine the long-term effects of persistent herbicides such as simazine. "Both soil chemical and plant physiological aspects are being studied".

One of the two review articles in Part II, Goss and Drew's **Effect of mechanical impedance on growth of seedlings**, presents a well-balanced account of the work carried out at Letcombe in this important area. The role of mechanical impedance in controlling root system development in forest trees has been underestimated or, more often, ignored. Goss and Drew make it clear that the growth of roots and shoots are profoundly influenced by mechanical impedance.

The report is exceptionally informative. It is well organized and, excepting a regrettable tendency to use "which" when "that" is meant, well written. No one with an interest in roots should be without this report.

R. F. Sutton

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**I.U.F.R.O. 3rd conference advisory group of forest statisticians.** Institut National de la Recherche Agronomique, 149, rue de Grenelle, Paris — 7<sup>e</sup>, I.N.R.A. Publ. 72-3. 332 p. 1972.

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This publication contains the papers presented at the 3rd Conference of the Advisory Group of Forest Statisticians, Section 25 (IUFRO), held in Jouy-en-Josas, France, September 7-11, 1970. Thirty-seven scientists from 17 countries — including 4 from Canada — participated in this conference. Of the 21 papers presented, 17 are in English, 3 in French, and 1 in Spanish. Depending on the original language of a particular paper, summaries are given in German, French and/or English. The majority of the articles end with a discussion section which records queries from the audience and the author's responses.

Dr. M. R. Tomassone wrote the introduction and is responsible for

the effective grouping of the papers into four sections according to the subject matter. A fifth section contains brief descriptions, by several of the contributors to the conference, of the computing facilities and biometrics services available at their respective research stations or universities.

Section 1 consists of a single paper presented by Dr. Jeffers in which he describes the methods of project planning and research administration that have been developed and adopted at the Merlewood Research Station, Grange-over-Sands, England, with particular reference to the statistical aspects of research planning. This paper should be of particular interest to government and industrial research managers.

Section 2, entitled **Forestry**

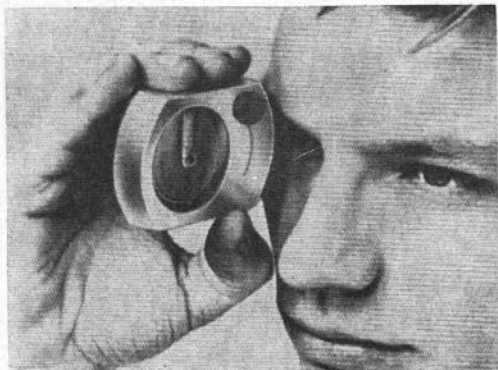
**Applications** contains 7 papers. These articles describe the results of recent research in various fields of forestry such as growth and yield, sampling, recreation, automatic field data collection, and experimental designs studies. The next 5 papers come in Section 3 and deal with topics on multiple linear and curvilinear regressions, stepwise regression, multivariate and factor analyses and also on analysis of nonlinear response surfaces. Section 4, entitled **Study of Stochastic Processes and Simulation** contains the remaining 8 papers. The first three of these articles are on sampling and stand growth simulation while the last five are on topics related to spatial distribution, belt transect sampling, and mathematical morphology and silviculture.

Despite the variety of styles and languages employed, the majority of the articles are well organized, clearly written, well referenced and contain sufficient mathematical proofs, where necessary. In addition, the discussion section following most of the articles will help clarify a few of the implied and/or inherent ambiguities in the articles.

In general, forest mensurationists and biometricians will find much of use to them in this book and perhaps should secure their own personal copy. Those interested in modeling will be most interested in Section 3 and part of Section 4, while foresters engaged in surveys and inventory will turn mainly to Section 2.

**Bijan Payandeh**

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