

Modern Methods of Plant Analysis

New Series Volume 8

Analysis of Nonalcoholic Beverages

Edited by

H.F. Linskens and J.F. Jackson



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Analysis of Nonalcoholic Beverages

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H.F. Linskens and J.F. Jackson

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Modern Methods of Plant Analysis

New Series Volume 8

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Introduction

Modern Methods of Plant Analysis

When the handbook *Modern Methods of Plant Analysis* was first introduced in 1954 the considerations were:

1. the dependence of scientific progress in biology on the improvement of existing and the introduction of new methods;
2. the difficulty in finding many new analytical methods in specialized journals which are normally not accessible to experimental plant biologists;
3. the fact that in the methods sections of papers the description of methods is frequently so compact, or even sometimes so incomplete that it is difficult to reproduce experiments.

These considerations still stand today.

The series was highly successful, seven volumes appearing between 1956 and 1964. Since there is still today a demand for the old series, the publisher has decided to resume publication of *Modern Methods of Plant Analysis*. It is hoped that the New Series will be just as acceptable to those working in plant sciences and related fields as the early volumes undoubtedly were. It is difficult to single out the major reasons for success of any publication, but we believe that the methods published in the first series were up-to-date at the time and presented in a way that made description, as applied to plant material, complete in itself with little need to consult other publications.

Contributing authors have attempted to follow these guidelines in this New Series of volumes.

Editorial

The earlier series *Modern Methods of Plant Analysis* was initiated by Michel V. Tracey, at that time in Rothamsted, later in Sydney, and by the late Karl Paech (1910–1955), at that time at Tübingen. The New Series will be edited by Paech's successor H. F. Linskens (Nijmegen, The Netherlands) and John F. Jackson (Adelaide, South Australia). As were the earlier editors, we are convinced "that there is a real need for a collection of reliable up-to-date methods for plant analysis in large areas of applied biology ranging from agriculture and horticultural experiment stations to pharmaceutical and technical institutes concerned with raw material of plant origin". The recent developments in the fields of plant biotechnology and genetic engineering make it even more important for workers in the plant sciences to become acquainted with the more sophisticated methods,

which sometimes come from biochemistry and biophysics, but which also have been developed in commercial firms, space science laboratories, non-university research institutes, and medical establishments.

Concept of the New Series

Many methods described in the biochemical, biophysical, and medical literature cannot be applied directly to plant material because of the special cell structure, surrounded by a tough cell wall, and the general lack of knowledge of the specific behavior of plant raw material during extraction procedures. Therefore all authors of this New Series have been chosen because of their special experience with handling plant material, resulting in the adaptation of methods to problems of plant metabolism. Nevertheless, each particular material from a plant species may require some modification of described methods and usual techniques. The methods are described critically, with hints as to their limitations. In general it will be possible to adapt the methods described to the specific needs of the users of this series, but nevertheless references have been made to the original papers and authors. While the editors have worked to plan in this New Series and made efforts to ensure that the aims and general layout of the contributions are within the general guidelines indicated above, we have tried not to interfere too much with the personal style of each author.

There are several ways of classifying the methods used in modern plant analysis. The first is according to the technological and instrumental progress made over recent years. These aspects were used for the first five volumes in this series describing methods in a systematic way according to the basic principles of the methods.

A second classification is according to the plant material that has to undergo analysis. The specific application of the analytical method is determined by the special anatomical, physiological, and biochemical properties of the raw material and the technology used in processing. This classification will be used in Volumes 6 to 8, and for some later volumes in the series. A third way of arranging a description of methods is according to the classes of substances present in the plant material and the subject of analytic methods. The latter will be used for later volumes of the series, which will describe modern analytical methods for alkaloids, drugs, hormones, etc.

Naturally, these three approaches to developments in analytical techniques for plant materials cannot exclude some small overlap and repetition; but careful selection of the authors of individual chapters, according to their expertise and experience with the specific methodological technique, the group of substances to be analyzed, or the plant material which is the subject of chemical and physical analysis, guarantees that recent developments in analytical methodology are described in an optimal way.

Volume Eight – Analysis of Nonalcoholic Beverages

Chemical analysis of plant products is vitally important to the field of food regulation and for the protection of public health and safety generally. Over several centuries it has been the advances in chemical analysis that have dictated and led to the formulation of laws and regulations governing food and beverages, and not the other way round. Adulteration of food has always occurred, by accident or design, but regulations covering this are not enforceable unless analysis can discriminate and detect such adulteration. It is up to the analytical chemist to develop and test accurate methods for analysis of food and beverages where it affects public health and safety, or the economic protection of the consumer. The food analyst should also carry out research in the analytical sciences where it impinges on agriculture, public health and regulatory controls of raw materials and products.

The editors have planned the present volume in such a way as to illustrate the sophistication and diversity that exists in the present-day application of chemical analysis to beverages and other foods. It will be of interest to students (both undergraduate and graduate) in the fields of agriculture and food technology, as well as to analytical scientists involved in particular areas of the food and beverage industry and wanting a handy reference to methods and applications in others. As can be seen from Volume 7 in the Series, which deals with analysis of beer, and from Volume 6, which will deal with wines and spirits, analysis plays an important part in regulating the products being offered to the public and in our understanding of the factors involved in the attractiveness of the product to the public. The latter may in time lead to a more economic production through replacement of expensive natural products with simpler or cheaper, and also safer, materials. Medically safer products may also be developed for those members of the general public who are suffering from particular disabilities. An example of this is the replacement of natural sugars, which cannot be taken by the diabetic population, with artificial sweeteners. These products were not available a few decades ago, which illustrates the importance of research in chemical analysis to our food and beverage industries.

We have gathered together in this volume chapters by some world authorities on various aspects of analysis of nonalcoholic beverages, all of them dealing with analytical methods for regulating control, quality-assurance or research. These eminent scientists have been chosen from a number of countries and they deal with a very wide spectrum of beverages, including the various fruit juices, teas, coffees, soft drinks, and so on. The editors hope that, together with Volumes 7 and 6 in this series, this volume on the analysis of beverages will provide an up-to-date account of analysis in various countries, the variety of methods available today for control, and the direction that research in the area is taking us. These three volumes should prove invaluable to scientists working in these and allied industries, as well as to students who are looking for some guidance for a career in chemical analysis of food and drinks. We would point out that although regulations and laws governing food and drink vary from country to country, and also with time, it is not the aim of this book to dwell on these factors, but rather to illustrate the large number and the diversity of methods available today which can be of service to the general public.

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Nijmegen and Adelaide, Spring 1988

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