

R for Plant Nutrition Research

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Preface

This is a Quarto book.

To learn more about Quarto books visit <https://quarto.org/docs/books>.

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1 Acknowledgements

The authors wish to acknowledge the many farmers, agricultural service providers, university students, faculty, and staff, as well as the statisticians and data scientists who have shared their time, expertise, insights, and guidance over the past many years. All of these interactions have created the vision for this work.

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2 Introduction

This book is intended to be a living compendium of procedures used in the field of plant nutrition. Because it is housed on GitHub, it is open-source and open-access, allowing interested experts to contribute, either by submitting additional procedures or by editing existing ones. We hope that, over time, this work becomes a source of best practices operationalized routinely by students, staff, and faculty in educational organizations, as well as by professionals in business and industry.

We dedicated ourselves to using only software that is open-access. This decision is meant to democratize this guidance for everyone with access to only a computer and the internet. Software applications with hidden fees and paywalls were avoided. All content was produced using [Quarto for books](#), and using [GitHub](#) as a repository for all book content, including figures and data sets. Editing was performed in [RStudio Desktop](#), and all code chunks were written in [R](#). When topics related to spreadsheets were addressed, we used [Google Sheets](#).

We hope you find this resource useful. If you see ways to improve it, please contact info@apni.net.

3 Preparing External Data

Before we import data into R, we need to ensure that they are ready. Key things to check are:

- the way data are organized
- the labels used
- data classes

3.1 Data Organization

R requires that data be “[tidy](#)” According to (Wickham, Vaughan, and Girlich 2023), tidy data are structured so that:

- Each column is a unique variable
- Every row is an observation for each variable; if no observation exists for a given variable, it is acceptable to use an entry that denotes a missing value
- Every cell contains only one value

An example of tidy data are shown below in

References

Wickham, Hadley, Davis Vaughan, and Maximilian Girlich. 2023. *Tidyr: Tidy Messy Data*.
<https://tidyr.tidyverse.org>.