Book Reviews

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Understanding Vineyard Soils

Robert E. White. Oxford University Press. 2009. 230 pp. $39.95. ISBN 978-0-19-531125-9.

Development of viticultural strategies that are focused on promoting uniformly high quality wine grapes requires an understanding of the properties that influence wine grape development. Although canopy and micrometeorological factors are often considered when developing and cultivating vineyards, soil properties and their variations are often not considered in a manner commensurate with their influence on wine grape development. Through trial and error over hundreds of years, French winemakers have recognized the concept of *terroir*, or a sense of place associated with a particular wine. As a hydrogeologist, I find the sensitivity of wine grape expression to climatic and soil-based processes, two components of terroir, to be a fascinating topic. Climate plays a dominant role in determining the success of certain viticultural regions or vintages. However, wine grapes of the same variety which are grown in the same microclimate region, cultivated, and made into wine using identical practices can lead to remarkably different wines when the grapes are grown on different types of soils.

Robert White comprehensively describes the many aspects of soil that are important for viticulture. In six chapters, he provides a solid foundation of vineyard soil science and also presents several current viticulture concepts that demand joint consideration of soils and climate, sustainability, agribusiness, and technology. The first two chapters describe how soils are formed—examples from several different types of vineyard soils throughout the world are presented. White describes how to assess the many factors important for a vineyard site, including climate, soil texture, water availability, and potential for vineyard pests. In these early chapters, he introduces the concept that soil spatial variability—often expressed over length scales of meters rather than kilometers—plays a significant role in grape and wine characteristics. Recognizing that spatial variability in soil properties is difficult to adequately characterize using conventional soil measurement approaches, White provides an up-to-date discussion of the use of surface geophysical and GIS-based techniques to identify natural soil variations in high resolution. The third chapter focuses on grapevine nutrition. This chapter includes an excellent discussion on nutritional needs, geochemical interactions in soils, and methods to test and correct for nutrient deficiencies. The material is nicely balanced in that it covers basic soil science concepts (e.g., nitrogen cycling in the vineyard, nutrient availability); provides practical guidance in the form of tables or informational boxes (e.g., how to calculate fertilizer application rates), and presents emerging concepts and technologies (e.g., remote sensing for indicating the spatial distribution of soil nutrient deficiencies). An in-depth discussion of root zone processes is provided in Chapter 4, including soil water availability and irrigation strategies. The physiological status of grapevines is greatly influenced by soil water availability, which is in turn influenced by soil physical characteristics such as texture, thickness, and structure. It is recognized that moderate water stress on grapevines early in the growing season can have a positive impact on the characteristics of red wine grapes. This chapter provides a good discussion of two irrigation strategies that have been designed to promote such water stress: regulated deficit irrigation and partial root zone drying. Vineyard carbon cycle and biological life are described in Chapter 5, where the function of beneficial and problematic soil organisms and methods to build up soil organic matter are discussed. The final chapter revisits and introduces some of the more integrative viticulture topics, including the role of precision viticulture for honoring natural soil variability in the development and management of vineyards, organic and biodynamic viticulture, climate change impacts, and integrative production systems that strive to balance environmental, economic, and societal needs associated with winegrowing. These new viticultural concepts are expected

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to become increasingly important as available land and water resources continue to decrease, as advanced datasets become less costly to collect and interpret, and as the public demand for high quality wine produced in an environmentally friendly manner continues to increase.

The book was well structured, informative, and a delight to read. I was particularly impressed by the balance of the material, which covered soil science fundamentals, practical guidance about how to assess and remediate vineyard soil problems, and the current state-of-knowledge in viticultural topics related to soils. Good explanations of technical terms are provided and a number of illustrations and photographs illustrate concepts described in the text. I particularly liked the tables and informational boxes that describe ideal soil property ranges and provide many "how to...." instructions. The level of technical detail provided in the informational boxes renders the book an invaluable reference for the practitioner while permitting the general text to be digestible to the more casual reader. Chapter summaries provide a concise synthesis of the main points. In comparison with Robert White's first book on this subject (*Soils for Fine Wine*, Oxford University Press, 2003), the present volume provides a less in-depth coverage of soil formation, mineralogy, and structure. Instead, there is a greater emphasis on the role of soil in viticulture, with a focus on addressing important soil properties for growing healthy vines, how a soil responds to its environment, and how human intervention can modify soil to improve grapevine performance. As such, *Understanding Vineyard Soils* should be of interest to a broader audience.

This vineyard is an extremely complex system, and this book provides the foundation needed to understand the role of the soil as a key component of this system. I highly recommended it to upper division and graduate viticulture, enology, and agronomy students, as well as to professionals in the wine industry. This book should also appeal to wine enthusiasts who strive to understand the natural origins of the interesting flavors, aromas, and textures that embody the liquid poetry we call wine.