

Preface

When Mr. Anthony Doyle suggested I put together a book on energy crops, I immediately thought of switchgrass, followed by two questions: is our current knowledge on switchgrass-for-energy substantial enough, and mature enough, to merit such a publication? Is it appropriate that this initiative be undertaken by a European with much less experience than his North American colleagues? The first answer was certainly positive, while the second can only be answered by the authors of the book and its future readers.

The reasons that led me to accept the challenge can be summed up in two closely connected objectives. In the first place, the desire to help bring the “scholar” closer to the “teacher”, in other words to combine the recent but significant knowledge acquired in Europe with the more substantial and consolidated North American knowledge. The other, more ambitious objective is to use the “energy” of switchgrass to create “synergy” in multidisciplinary communications among scientists and stakeholders, as well as in parallel R&D programs in Europe, North America, and elsewhere.

Undoubtedly, there are still many questions regarding science and technology associated with the production and utilization of switchgrass, and the ambition of this book is to offer a state-of-the-art overview on the knowledge and prospects of switchgrass as a raw material for energy use, as well as suggestions for future research programs. Nearly all the areas of lively current research which have received ample attention, such as crop management, physiology, genetics and genomics, logistic, economic and environmental assessment, and transformation processes, are touched upon here.

In the introductory chapter, David Parrish and co-authors provide a fascinating description of the evolution of switchgrass from its prehistoric origins to the late-twentieth century efforts to develop it into an energy crop. In [Chap. 2](#), Michael Casler presents a brilliant review on the genetics and genomics of switchgrass, showing how this species is still greatly undomesticated with a vast potential for improvement of biofuel traits. Crop physiology is extensively discussed in [Chap. 3](#) by Walter Zegada-Lizarazu and co-authors, who emphasize the considerable use efficiency of natural resources by this crop, which indeed could be significantly

improved through developing permanent switchgrass physiology programs. In [Chap. 4](#), Matt Sanderson and co-authors provide an in-depth overview on the agronomy of switchgrass, and the specific management characteristics it requires if yield and quality are to be maximized. Rob Mitchell and Marty Schmer reviewed the importance of harvest and storage methods in providing consistent and high-quality biomass to conversion plants. In [Chap. 5](#), the authors clearly point out the critical effects of harvest and storage management on feedstock characteristics as landscape scale deployment of switchgrass for bioenergy moves forward. Whilst switchgrass undoubtedly has potential advantages, it could have ecological or environmental weaknesses in some situations. These issues are analyzed and discussed in [Chap. 6](#) by Howard Skinner and co-authors, who reviewed the major environmental impacts of growing switchgrass as an energy crop, including the current debate on land use change which has led to the fuel versus food debacle. Several challenges still have to be overcome to produce biofuels and chemicals from biomass in an economic and sustainable manner. Different processing steps within the biochemical and thermochemical platforms are accurately discussed in [Chap. 7](#) by Venkatesh Balan and co-authors, while the analysis of economic viability and conditions under which switchgrass becomes cost-competitive are skilfully examined in [Chap. 8](#) by Anthony Turhollow and Francis Eplin.

I am extremely grateful to the authors for preparing the excellent contributions to this book of which I have the honor of being the editor, and to those whom I could not invite due to the size of the book, I offer my apologies.

Andrea Monti
University of Bologna