

Preface

It is more than 25 years ago that gene silencing was described for the first time, although at that stage the mechanism was not understood (Napoli *et al.*, 1990; van der Krol *et al.*, 1990). The progress during the last 25 years or so has been simply remarkable: we now do not just understand how gene silencing happens down to a very detailed molecular level, but many strategies have been developed to harness this phenomenon. This book describes both the theory of gene silencing and also the application.

The first five chapters discuss different aspects of the gene silencing mechanism. Since the silencing pathways are particularly diverse in plants, a whole chapter is dedicated to describe these (Chapter 1). It is a generally accepted view that gene silencing has evolved in plants as a defence mechanism against viruses, therefore Chapter 2 discusses the 'arms race' between plants and viruses, how viruses trigger silencing and also evolved proteins that can suppress it. Another aspect of gene silencing is the epigenetic changes caused by silencing. This, and how we can direct epigenetic changes, is described in Chapter 3. Finally, the theoretical part is closed by two chapters on how gene silencing works in algae (Chapter 4) and fungi (Chapter 5), two groups of organisms related to plants.

The second part of the book is dedicated to application of gene silencing. Small non-coding RNAs are key molecules in the mechanism and Chapter 6 discusses various strategies to produce small artificial RNAs. The following chapters describe the application of gene silencing to influence specific, agronomically important traits in plants, including traits for industrial use (Chapter 7) and nutritional value (Chapter 8). The last three chapters review the use of gene silencing to provide resistance against different types of pathogens including fungi (Chapter 9), nematodes (Chapter 10) and viruses (Chapter 11).