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Book Review

Wattles on the move

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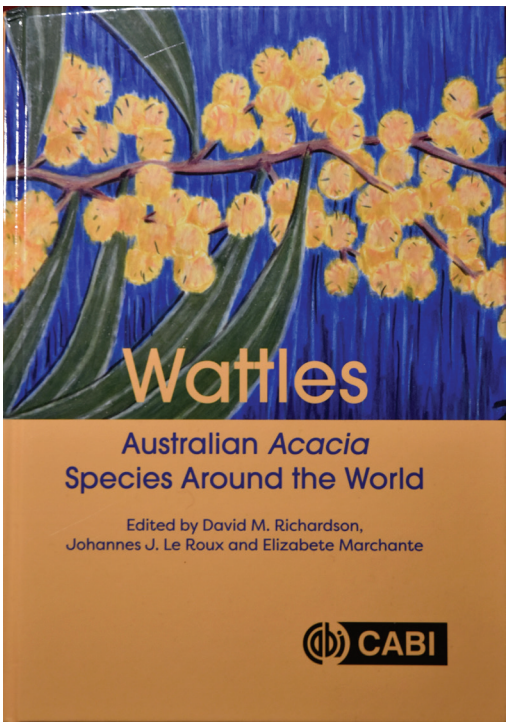
Travelling through parts of South Africa or Iberia, such as north-western Portugal, it would be easy to imagine that one is in the heart of the Australian bush, such is the abundance, prominence and diversity of species of Australian acacias that are now found in these areas. *Acacia*, a genus of more than 1,000 species of shrubs and small to medium-sized trees – known generically in Australia as "wattles "– now dominate significant areas in parts of the world where they are introduced. In Portugal, alongside the wattles, are large-scale plantations of eucalypts, further accentuating just how 'Australian' some of these distant habitats have become. It is this process of the globalisation via introductions and invasions of wattles that is the focus of a new book: "Wattles. Australian *Acacia* Species Around the World", published by CABI in 2023, and edited by David Richardson, Johannes Le Roux and Elizabete Marchante, who appropriately work respectively in South Africa and Portugal.

While it is well-known that the large, mainly Australian, legume genus *Acacia* is now one of the planet's most widely spread plant genera, the sheer scale and extent of its anthropogenic translocation are quite staggering. As documented in this new book, 41% of the 1082 species of *Acacia*, i.e. 417 species, are known to occur as non-natives; introduced *Acacia* species have been recorded from 172 countries; 75



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species have established self-sustaining populations following introductions; 28 species are classified as invasive and causing substantial ecological and socio-economic impacts. This global tallying up of the history of introductions and their current status is an impressive achievement of this book, establishing a global database and baseline for future comparisons and analyses. It is also notable that the sheer scale of translocation of so many species of wattles to different regions across the world opens opportunities for understanding the drivers and trajectories of plant invasions via large scale comparative studies of species and regions. For example, what are the relative contributions of variation in intrinsic species biology versus extrinsic factors in dictating the outcomes of introductions? Similarly, why have the impacts of introduced species been apparently much more benign in some regions than others? This scope to address general questions make wattles a flagship group for understanding invasion biology. Quite simply, Australia's wattles are among the plants that are central to the unfolding story of neobiotic species in the Anthropocene.

This book explores in great depth and breadth the insights that can be gained from understanding these plants. With 122 authors from 17 countries, spanning a wide range of disciplines, this book represents a goldmine of knowledge about the ecology, evolutionary biology, biogeography and macroecology, utility and invasiveness of the genus *Acacia*, the second largest genus of legumes (Fig. 1), and its spectacular conquest of the world.

The book starts with a series of chapters that presents a synthesis of the taxonomy, environmental amplitudes and functional trait and genetic attributes of the vast natural species pool encompassed by the genus *Acacia*, linking that knowledge to the invasion status and invasiveness potential of species. This is followed by a set of chapters documenting the history of introduction, spread and invasion of acacias, dubbed the Anthropocene conquest of the globe by the wattles. This synthesis is based around detailed regional studies in Europe, California, Africa, Brazil/Chile, and New Zealand, including data on the utility and perceptions of wattles by people around the world. Next, follow chapters on the biology of interactions between *Acacia* and other groups of organisms – symbionts, seed dispersers, pollinators, and pests and diseases – biology that underpins our understanding of why wattles are such successful invaders. It is this biological knowledge that also provides the basis for developing potential biological control and management options in areas where wattles have invaded. There are then chapters devoted to assessments of the impacts – social, economic and ecological – of *Acacia* introductions and invasions. The final section of the book is devoted to discussing ways to control, monitor, manage and model wattle invasions. The concluding chapter, entitled the 'Wattles' Invasion Syndrome, attempts to encapsulate the key elements of why acacias are such prominent travellers and invaders. This is neatly summed up in the book as **W**oody **A**ustralian **T**rees that **T**ransform landscapes: **L**eguminous, **E**nemy-free, with persistent **S**eedbanks, i.e., **WATTLES**!, a syndrome that may be applicable to other groups of woody plant invaders.

In common with many invasive tree species and genera that have been moved around the globe, wattles stand out as conflict trees. This is because they were usually introduced deliberately for forestry, agroforestry, soil stabilisation and as ornamental garden plants and can confer important economic, environmental or aesthetic benefits, but at the same time bring with them environmentally transformative impacts in the form of species invasions. These impacts include even the establishment of novel ecosystems, so-called "wattle jungles" or thickets, following

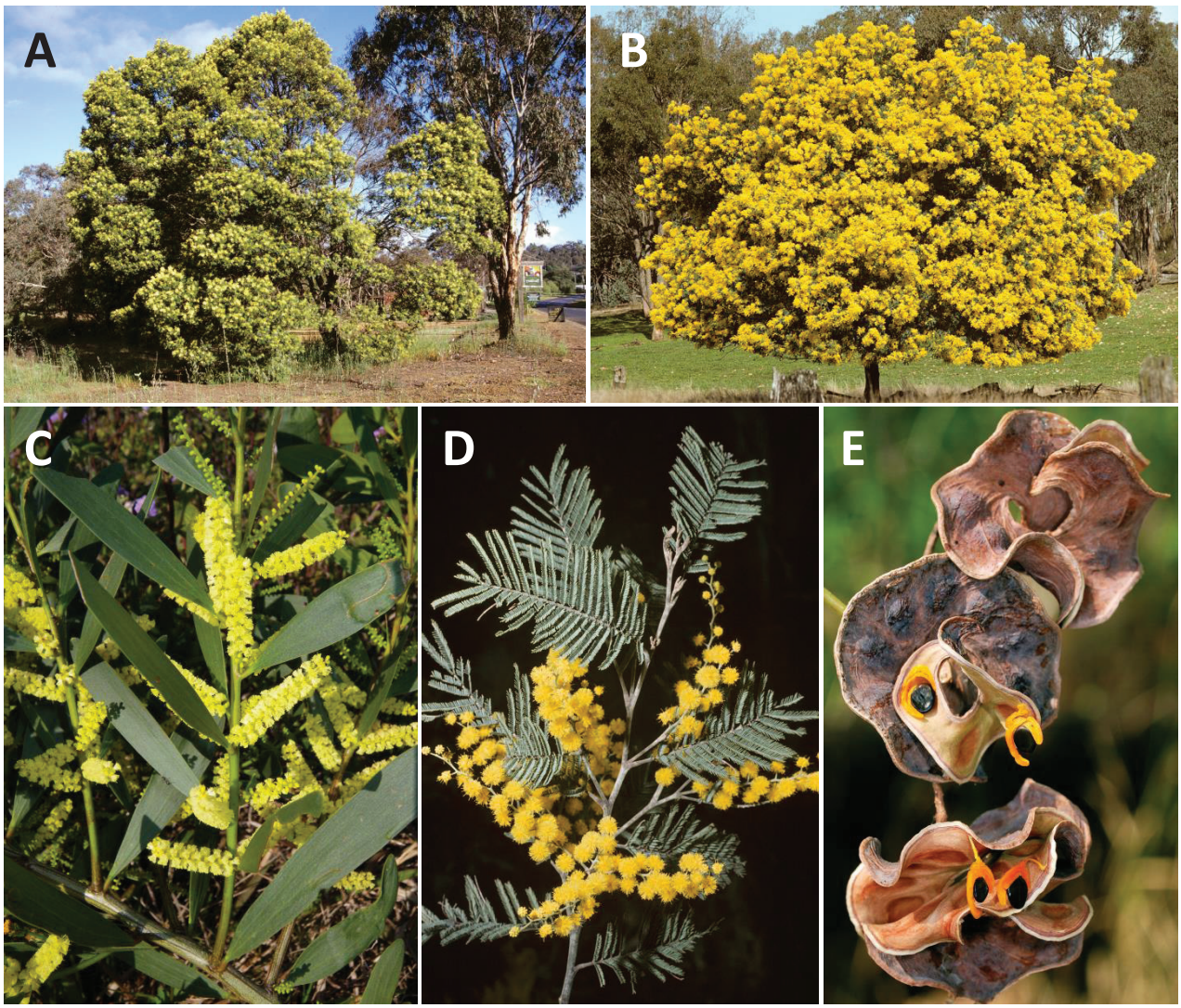

Figure 1. A selection of the 28 species of Australian *Acacia* that are invasive where introduced, showing growth forms, leaves, flowers and fruits **A** tree of *Acacia mearnsii*, Bridgetown, Western Australia **B** tree of *A. dealbata* subsp. *dealbata* in full flower **C** phyllodes (modified leaves) and spicate inflorescences of *A. longifolia* subsp. *sophorae* **D** bipinnate leaves and capitate inflorescences of *A. dealbata* subsp. *dealbata* **E** fruits and seeds with fleshy arils of *A. auriculiformis*. Photos courtesy of Bruce Maslin (**A**), Alan Gibb (deceased) (**B**), Lachlan Copeland (**C**), Alan Gibb (D), Kym Brennan (**E**).

invasion or abandonment of *Acacia* plantations. This book achieves a well-balanced perspective on what can often be polarised views of such conflict trees, giving attention to both the positive benefits and negative impacts of introductions. In that context, the book includes chapters devoted to sociological, not just biological and ecological aspects. This is important in revealing, for example, that planting intensity and scale, especially for forestry, is one of the principal determinants of whether species become invasive or not, and that changing perceptions about the value and utility of species are likely key determinants of future invasive trajectories. Above all, what comes across is that the social-ecological dynamics of wattle introductions and perceptions of their utility and value, are indeed dynamic, are far from stable through time, and are likely to continue to change in a rapidly changing world.

This importance of history and shifting perceptions through time is also amply revealed by the contributions in this book. The successive waves of interest in exporting and importing species of wattles at different times in history in different

parts of the world are documented. The most recent wave of spread has resulted in by far the largest wattle production areas on the planet spanning millions of hectares of wattle plantations in south-east Asia over the last few decades (e.g. 6% of Vietnam's land area in the last 20 years). Given this recent Acacia boom in south-east Asia it is perhaps a pity that no chapter focused specifically on the history and status of introductions in that region was included alongside the other regional syntheses. Nonetheless, this minor criticism does not detract from the overall global panorama that stands out in this book. This panorama demonstrates that, in addition to comparative biological and biogeographical data, wattle introductions and invasions also present a valuable comparative time series that can provide further potent insights into invasions more generally.

This book presents an outstanding global synthesis of the biology, ecology, biogeography and management of one of the most important groups of tree invaders globally. It is essential reading not just for those with a specific interest in wattles, but to everyone working on the biology and ecology of species invasions more generally.

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Additional information

Conflict of interest

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Data availability

All of the data that support the findings of this study are available in the main text.