

INTELLECTUAL PROPERTY LAW OF PLANTS

MARK D. JANIS
HERBERT H. JERVIS
AND
RICHARD PEET

Preview: www.oxfordjournals.com
Copyrighted Material

OXFORD
UNIVERSITY PRESS

OXFORD
UNIVERSITY PRESS

Great Clarendon Street, Oxford, OX2 6DP,
United Kingdom

Oxford University Press is a department of the University of Oxford.
It furthers the University's objective of excellence in research, scholarship,
and education by publishing worldwide. Oxford is a registered trade mark of
Oxford University Press in the UK and in certain other countries

© Oxford University Press, 2014

The moral rights of the authors have been asserted

First Edition published in 2014

Impression: 1

All rights reserved. No part of this publication may be reproduced, stored in
a retrieval system, or transmitted, in any form or by any means, without the
prior permission in writing of Oxford University Press, or as expressly permitted
by law, by licence or under terms agreed with the appropriate reprographics
rights organization. Enquiries concerning reproduction outside the scope of the
above should be sent to the Rights Department, Oxford University Press, at the
address above

You must not circulate this work in any other form,
and you must impose this same condition on any acquirer

Crown copyright material is reproduced under Class Licence
Number C01P0000148 with the permission of OPSI
and the Queen's Printer for Scotland

Published in the United States of America by Oxford University Press
198 Madison Avenue, New York, NY 10017, United States of America

British Library Cataloguing in Publication Data
Data available

Library of Congress Control Number: 2013946439

ISBN 978-0-19-870091-3

Printed by
Lightning Source UK Ltd

Links to third party websites are provided by Oxford in good faith and
for information only. Oxford disclaims any responsibility for the materials
contained in any third party website referenced in this work.

1

OVERVIEW: THE INTELLECTUAL PROPERTY COMPLEX FOR PLANTS

A. The Problem of Plants in Intellectual Property Law	1.03	(1) Sources of international plant IP law	1.10
		(2) Sources of US plant IP law	1.15
B. The Intellectual Property Law Framework for Plant Innovation	1.09	C. Organization of this Book	1.32

This book necessarily indulges the premise that a body of “plant intellectual property law” exists, with a sufficient degree of independence from the rest of intellectual property law to warrant its own separate treatment. It does exist, and it needs its own treatment. We have tried to meet that need here.¹ In this book, we have analyzed bodies of intellectual property law that were created exclusively for various sorts of plant innovation, both at the international and domestic levels. We have also drawn from bodies of mainstream intellectual property law the selected components that have special application to plants. So, for example, we have looked to utility patent law, with particular attention to its debates about whether plant varieties qualify as eligible subject matter for protection. We have considered trademark law and its interaction with rules that require plant varieties to be designated with a variety denomination. We have also accounted for bodies of law that engage with intellectual property law in a way that is especially relevant for plant breeders—such as the emergent bodies of law dealing with crop biodiversity conservation. **1.01**

This Chapter introduces the problems that plant innovation has presented for intellectual property law (Section 1.A). It then provides an overview of the law’s response to those problems (Section 1.B). It concludes with a brief explanation of the organizational structure of the book (Section 1.C). **1.02**

A. The Problem of Plants in Intellectual Property Law

The concept that biological material—and plants specifically—could be the subject of intellectual property protection was established decades ago in US law,² and reaffirmed since then.³ But even setting aside this threshold question, plants present a deep contradiction **1.03**

¹ Other important treatments of plant intellectual property law include MARGARET LLEWELYN & MIKE ADCOCK, *EUROPEAN PLANT INTELLECTUAL PROPERTY* (2006); LAURENCE R. HELFER, *INTELLECTUAL PROPERTY RIGHTS IN PLANT VARIETIES: INTERNATIONAL LEGAL REGIMES AND POLICY OPTIONS FOR NATIONAL GOVERNMENTS* (2004). The leading collection of scholarly articles is JAY KESAN, *AGRICULTURAL BIOTECHNOLOGY AND INTELLECTUAL PROPERTY: SEEDS OF CHANGE* (2007).

² See Chapter 6 (discussing the enactment of the US plant patent provisions in 1930).

³ *J.E.M. Ag Supply v. Pioneer Hi-Bred International*, 534 U.S. 124 (2001) (discussed *in* Chapter 7). Controversies over demarcating the boundary line between products of nature and products of human

for intellectual property policy. On the one hand, plants arguably present the strongest of cases for robust intellectual property protection. Elite plant varieties are expensive and time-consuming to produce; yet, once created, they are inexpensive to duplicate. Indeed, in the case of self-pollinating plants, they may replicate themselves prodigiously.⁴ In such circumstances, it is widely assumed that reliable intellectual property protection is important in order to secure investments in research and development. On the other hand, plant breeders work by gaining access to existing germplasm. Plant breeding thus may be said to be a canonical example of sequential innovation, where continued progress may depend on the maintenance of a robust public domain (as some would put it) or at least on a set of carefully articulated and secure carve-outs from intellectual property protection. Plant intellectual property law strives to mediate between these two impulses. This higher-level design question is one aspect of the problem of plants in intellectual property law.

- 1.04** Another aspect of the problem is doctrinal. Neither of the two traditional paradigms of intellectual property (patent and copyright) developed with an eye towards protecting plant innovation. Patent law developed against a backdrop of predominantly mechanical inventions, and copyright law developed in an age of print media. Neither seemed a good fit for plants, at least in some minds. For many years, plants were not regarded as being susceptible to detailed written disclosures of the type commonly accepted for mechanical inventions. Moreover, in view of limitations in the state of knowledge of plant genetics, plant breeding was viewed as intuitive and unpredictable, and thus not a good fit for straightforward rules prohibiting duplication. As plant breeding became accepted as a branch of scientific enterprise, and as seed companies and nurseries began to develop, the pressure to extend intellectual property protection to plants began to mount. The legal system's response proceeded concurrently along multiple dimensions: some "hybrid" intellectual property regimes were designed specifically for plants,⁵ and some adaptations to the traditional paradigms were formulated. The result, as we detail in this book, is a remarkable landscape of intersecting intellectual property regimes, and institutions that support those regimes—a landscape that has often seemed baffling to outsiders.
- 1.05** This response to the fundamental problem of doctrinal design has spawned additional doctrinal challenges which appear, in one guise or another, throughout the book. One recurrent doctrinal question is whether (and to what extent) traditional intellectual property regimes such as patent law should elaborate rules that are tailored to specific industries.⁶ Another critical question is whether (and, again, to what extent) overlaps in intellectual property protection should be permitted, most critically between utility patent protection and plant breeders' rights protection.
- 1.06** Plant intellectual property poses a number of additional challenges beyond the realms that we have discussed so far, challenges that may be quite unlike those encountered in other industry

ingenuity still linger. *See, e.g.*, *Assoc. for Molecular Pathology v. Myriad Genetics, Inc.*, 133 S.Ct. 2107 (2013) (patent eligibility of claims to isolated genetic material).

⁴ *See* Jim Chen, *The Parable of the Seeds: Interpreting the Plant Variety Protection Act in Furtherance of Innovation Policy*, 81 NOTRE DAME L. REV. 105 (2005) (observing that "[p]lant breeders therefore face two sources of competitive pressure whenever they release seed into the market. Not only must they fend off competing breeders, but every customer is also a potential rival" because each customer can produce more seeds and replant them).

⁵ The use of the term "hybrid" here comes not from the plant breeding literature, but from J.H. Reichman, *Legal Hybrids between the Patent and Copyright Paradigms*, 94 COLUM. L. REV. 2432 (1994).

⁶ *See* Dan L. Burk, *Is Patent Law Technology-Specific?*, 17 BERKELEY TECH. L.J. 1155 (2002); *see also* Dan L. Burk & Mark A. Lemley, *Policy Levers in Patent Law*, 89 VA. L. REV. 1575 (2003); Mark D. Janis, *Comment: Equilibrium in a Technology-Specific Patent System*, 54 CASE W. RES. L. REV. 743 (2004).

sectors. Food security is one such unique area of concern. Intellectual property rights are designed to create artificial scarcity. Some would contend that when intellectual property rights are applied to crop plants that are grown for food, the result might be literally to take food from peoples' mouths. Others would point out that those very intellectual property rights systems play a role in drawing investment into plant breeding programs that may result in the development of agronomically improved plant varieties.⁷ Whether plant intellectual property disrupts or bolsters food security is likely to depend on fine details of implementation. We concern ourselves with those details in this book.

Plant intellectual property also has potential cultural implications that distinguish it from other types of intellectual property. For example, some view intellectual property regimes as a threat to the perpetuation of traditional agricultural practices, such as the saving and replanting of seed by farmers. Others view these claims of cultural dissonance with some skepticism, especially when growers choose to plant elite, modern biotech seeds and then invoke traditional practice to justify saving and replanting those seeds.⁸ **1.07**

This book touches on all of these problems. It does so chiefly from a pragmatic perspective. It aims to provide a practical resource for those who deal with the details of the law's doctrinal response to the challenges that plants pose for intellectual property law. **1.08**

B. The Intellectual Property Law Framework for Plant Innovation

Efforts to address the problem of plants in intellectual property have resulted in the emergence of a unique body of jurisprudence that incorporates elements of many conventional intellectual property law systems, along with a handful of systems developed specifically for plant innovation. We briefly summarize the relevant bodies of law below. **1.09**

(1) Sources of international plant IP law

(a) TRIPS

The Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS)⁹ explicitly addresses plant intellectual property. The agreement permits members to exclude from utility patent protection "plants and animals other than micro-organisms, and essentially biological processes for the production of plants or animals other than nonbiological and microbiological processes."¹⁰ This exclusion is exceptional; it derogates from the general principle that "patents shall be available and patent rights enjoyable without discrimination as to... the field of technology."¹¹ However, the exclusion is also limited: members "shall provide for the protection of plant varieties either by patents or by an effective *sui generis* system or by any combination thereof."¹² According to the conventional understanding, an "effective **1.10**

⁷ For brief survey of the relevant issues, see Geertrui Van Overwalle, *A Man of Flowers: A Reflection on Plant Patents, the Right to Food and Competition Law*, in *TECHNOLOGY AND COMPETITION: CONTRIBUTIONS IN HONOUR OF HANS ULLRICH* 311 (J. Drexel, ed., 2009).

⁸ Leading studies include CARY FOWLER, *UNNATURAL SELECTION: TECHNOLOGY, POLITICS, AND PLANT EVOLUTION* 152 (1994); JACK RALPH KLOPPENBURG, JR., *FIRST THE SEED: THE POLITICAL ECONOMY OF PLANT BIOTECHNOLOGY* (1988).

⁹ Agreement on Trade-Related Aspects of Intellectual Property Rights, Apr. 15, 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex 1C, *THE LEGAL TEXTS: THE RESULTS OF THE URUGUAY ROUND OF MULTILATERAL TRADE NEGOTIATIONS* 320 (1999), 1869 U.N.T.S. 299, 33 I.L.M. 1197 (1994) (hereinafter TRIPS).

¹⁰ TRIPS, note 9, Art. 27(3)(b).

¹¹ TRIPS, note 9, Art. 27(1).

¹² TRIPS, note 9, Art. 27(3)(b).

sui generis system” includes UPOV-compliant¹³ plant breeders’ rights systems (discussed in Section B(1)(b)), but is not necessarily limited to those systems.¹⁴ Utility patent protection for plant varieties remains a matter of controversy in many parts of the world, whereas the *sui generis* system is a less controversial alternative, especially among countries with little tradition of intellectual property protection. Accordingly, one pragmatic consequence of the TRIPS exclusion for plant varieties is to anoint plant breeders’ rights systems as the most ubiquitous form of plant intellectual property rights worldwide.

(b) UPOV

- 1.11** The UPOV¹⁵ Agreement introduced the modern concept of the *sui generis* plant breeders’ right (called in some jurisdictions plant variety protection) and established a legal framework for plant breeders’ rights systems. It also created a governing organization, also referred to as UPOV.¹⁶ The original text of the agreement, UPOV (1961),¹⁷ has been amended three times (in 1972, 1978, and 1991).¹⁸ More than 70 countries are UPOV members.¹⁹ Most have implemented the UPOV (1991) in national legislation, while some still follow UPOV (1978).²⁰
- 1.12** In addition to establishing certain administrative arrangements and procedural rules, the UPOV agreement sets out the substantive conditions for securing plant breeders’ rights protection, along with the rules that govern the enforceable scope of those rights.²¹ Under UPOV (1991), most of the substantive rules and conditions are mandatory, in the sense that members must incorporate them into national law.²² Some rules are optional—for example, the rule that limits the scope of plant breeders’ rights to permit the replanting of farm-saved seed.²³ As to other matters, UPOV (1991) is deliberately silent. For example, UPOV (1991) omits language from UPOV (1978) that had appeared to prohibit members from protecting plant varieties under both a utility patent system and a plant breeders’ rights system, leaving members with broad discretion to decide how to approach the dual protection issue.
- 1.13** UPOV has created an extensive set of administrative documents setting out guidance, explanatory notes, and other protocols for implementing UPOV systems. Because of the

¹³ When used in the context of the agreement, UPOV stands for the International Convention for the Protection of New Varieties of Plants.

¹⁴ See generally Bonnie Koo et al., *Plants and Intellectual Property: An International Appraisal*, 306 SCIENCE 1295 (2004) (concluding that countries were tailoring intellectual property protection to local circumstances within the parameters allowed under the TRIPS agreement); but see Srividhya Ragavan, *To Sow or Not to Sow: Dilemmas from Creating New Food Rights*, in AGRICULTURAL BIOTECHNOLOGY AND INTELLECTUAL PROPERTY: SEEDS OF CHANGE 320 (Jay Kesan, ed., 2007) (arguing that UPOV systems are insufficiently flexible for developing countries and hence are not “effective” in the sense of TRIPS).

¹⁵ See Chapter 3 for a discussion of the UPOV Agreement; Chapter 4 for a discussion of its implementation in US law; and Chapter 5 for a discussion of plant breeders’ rights systems in other jurisdictions.

¹⁶ When used in this context, the acronym refers to the International Union for the Protection of New Varieties of Plants. The organization maintains an extensive website: <http://www.upov.int/portal/index.html.en>.

¹⁷ International Convention for the Protection of New Varieties of Plants, Dec. 2, 1961, 33 U.S.T. 2703, 815 U.N.T.S. 89.

¹⁸ All texts of the UPOV Agreement can be found at <http://www.upov.int/upovlex/en/acts.html>.

¹⁹ Members of the International Union for the Protection of New Varieties of Plants, <http://www.upov.int/export/sites/upov/members/en/pdf/pub423.pdf>.

²⁰ Members of the International Union for the Protection of New Varieties of Plants, <http://www.upov.int/export/sites/upov/members/en/pdf/pub423.pdf>.

²¹ UPOV (1991) Chs. VIII–X are devoted to organizational and administrative matters. Chapters I–V and VII deal with substantive rules.

²² For example, the basic conditions for protection (novelty, distinctness, uniformity, and stability) are mandatory. See Chapter 3, Section C(4) (introducing these concepts).

²³ Discussed in Chapter 3, Section C(7)(b).

widespread adoption of UPOV systems and the extensive institutional investments that have accompanied those systems, we expect that UPOV systems will continue as a major feature of the plant intellectual property ecosystem for some time to come.

(c) *Biodiversity Treaties*

Two international treaties concerned primarily with the conservation of biodiversity warrant mention here because of the interface between resource conservation, equitable benefit-sharing, and intellectual property rights. In 1992, the United Nations Conference on Environment and Development adopted the Convention on Biodiversity (CBD)²⁴ to promote “conservation of biological diversity, sustainable use of its components, and fair and equitable sharing of benefits” deriving from the use of biological resources. In 2001, the Conference of the Food and Agricultural Organization (FAO) adopted the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA),²⁵ with conservation and benefit-sharing objectives similar to those of the CBD, but directed at crop biodiversity. The ITPGRFA recognized the concept of farmers’ rights,²⁶ albeit without defining it. Farmers’ rights generally refer to mechanisms for protecting traditional knowledge in respect to plant genetic resources for food and agriculture, rights to share in benefits deriving from those resources, and rights to participate in the political process for making policy decisions regarding the conservation and use of those resources. Accordingly, farmers’ rights may involve the promulgation of new forms of intellectual property protection as well as the establishment of new limitations on the scope of existing intellectual property protection. We discuss these matters in Chapter 12.

1.14

(2) Sources of US plant IP law

(a) *US Plant Variety Protection Act*

In 1970, the United States enacted plant variety protection via the Plant Variety Protection Act (PVPA), now codified at 7 U.S.C §§ 2521–2583. The US became a member of UPOV in 1981, although it did not ratify the UPOV Agreement until 1999. Prior to that time, the US had objected to a UPOV provision (subsequently eliminated) that prohibited Members from offering both patent protection and plant variety protection to plants.

1.15

Plant variety protection is sometimes described as patent-like protection for seed-grown plants. This comparison is accurate only at a superficial level. Applications for plant variety protection do undergo a substantive examination prior to grant, and the grant results in a set of exclusive rights that the owner can assert in civil litigation. However, the conditions for granting plant variety protection are less rigorous than those for granting utility patents, and the exclusive rights are, correlatively, less robust than those afforded by the utility patent system. In particular, the Plant Variety Protection Act does not require non-obviousness as a condition for protection, and it does not require that a seed sample be deposited in a publicly accessible depository. On the other hand, the exclusive rights granted to plant variety protection (PVP) certificate holders are subject to numerous limitations and exemptions that have no counterparts in utility patent law. For example, PVP rights are subject to a breeder’s exemption that permits breeders to use the protected variety to develop commercial alternatives. PVP rights are also subject to a limited, albeit controversial, seed-saving exemption that permits farmers to save and replant protected seed for use on their own farms.

1.16

²⁴ United Nations Conference on Environment and Development: Convention on Biological Diversity, June 5, 1992, 1760 U.N.T.S. 143 (hereinafter CBD), available at <http://www.cbd.int/doc/legal/cbd-en.pdf>.

²⁵ International Treaty on Plant Genetic Resources for Food and Agriculture, Nov. 3, 2001, 2004 U.N.T.S. 303 (hereinafter ITPGRFA), available at <http://www.fao.org/docrep/011/i0510e/i0510e00.htm>.

²⁶ ITPGRFA, note 25, Art. 9.

1.17 Plant variety protection is commonly used in the US seed industry, where it is generally viewed as a modest but useful form of intellectual property protection, especially as a supplement to utility patent protection. Litigation over plant variety protection in the US has been relatively rare.

(b) US Plant Patent Act

1.18 Chapter 15 of the US patent statute, 35 U.S.C. §§ 161–164, governs the US plant patent system. The Plant Patent Act came into force in 1930, primarily at the urging of breeders of nursery stock and ornamentals. The plant patent legislation includes only a limited number of provisions specific to plant patents. Except as dictated by these specialized provisions, the general law of utility patents applies to plant patents.

1.19 A key distinguishing feature of the plant patent legislation is the asexual reproduction requirement. Asexual reproduction of the protected plant by the patentee is a patentability requirement; unauthorized asexual reproduction of the patented plant by the infringer is a requirement for showing infringement. As a practical matter, this means that the alleged infringer must have access to physical specimens of the patented plant and must take cuttings from them and graft them to rootstock for propagation.

1.20 Accordingly, plant patent protection is valuable in plant breeding endeavors in which asexual reproduction is the chief mechanism for commercial propagation. This remains true in the nursery industry, but is not the case for major crops. Hence, crop plants are usually protected by other means, such as utility patents or plant variety protection.

(c) US utility patents

1.21 The debate over extending US utility patent protection to plants is long-running, extending back before the passage of either the Plant Variety Protection Act or the Plant Patent Act. Even when it became accepted that plant breeding was a scientific discipline whose practitioners might be worthy of being called inventors, some observers considered the utility patent system to be a poor fit for plants.

1.22 The emergence of two specialized intellectual property regimes for plants (the Plant Patent Act and the Plant Variety Protection Act) only partially alleviated the pressure to resolve the question of whether plants could qualify for utility patent protection, a more powerful intellectual property right. Two events in the 1980s tipped the balance in favor of exploring utility patent protection for plants. First, the Supreme Court's *Diamond v. Chakrabarty*²⁷ decision demonstrated that there was no absolute proscription against patent protection for living subject matter. Second, the biotechnology industry gained momentum in the US, and firms sought protection for a wide array of biotechnology products and processes, including innovations in plant biotechnology.

1.23 In 2001, in *J.E.M. v. Pioneer Hi-Bred*,²⁸ the Supreme Court confirmed that plants are eligible for US utility patent protection. By that time, the US Patent and Trademark Office already had granted such patents in substantial numbers.

1.24 Utility patent protection has developed into a critical mode of protection for biotech crop plants and other plant biotechnology innovations. Utility patents associated with Roundup-Ready® and *Bacillus thuringiensis* (*Bt*) technology, for example, may be as commercially valuable as any that have issued in recent decades.

²⁷ *Diamond v. Chakrabarty*, 447 U.S. 303 (1980).

²⁸ *J.E.M. v. Pioneer Hi-Bred International*, 534 U.S. 124 (2001).

The legal issues associated with utility patents on plants largely reflect the issues that are common to all types of biotechnology patents, such as issues of adequate description under 35 U.S.C. § 112, and the scope of the doctrine of equivalents. Some issues concerning utility patent protection for plants have not yet been vetted in the courts—for example, the application of the non-obviousness standard to the products of conventional plant breeding programs. A few issues are uniquely important for plants. For example, the freedom of farmers to save and replant seed is a politically divisive issue that has brought to the fore questions about whether (and to what extent) patent rights in seeds are exhausted when a patent owner sells patented seeds to farmers.²⁹ **1.25**

Utility patents will continue to play a major role in the seed business. Accordingly, the evolving jurisprudence of utility patent law as applied to plants will continue as a matter of primary concern, both within the trade and as a general matter of agricultural policy. **1.26**

(d) Other forms of protection

Plant breeders have access to a number of other forms of intellectual property protection in most legal systems. In the United States, trade secret protection is likely to be available for various aspects of plant innovation, such as the identities and genetics of inbred parent lines of a commercial hybrid.³⁰ Trademark protection is also valuable for some plant breeders, although the requirement to designate a variety denomination must be taken into account.³¹ **1.27**

(e) Observations: does plant intellectual property law promote innovation?

This book does not aim to address the ultimate question about whether the collective body of plant intellectual property law satisfies the general utilitarian goal of promoting progress in plant breeding. We doubt whether this question is answerable in a comprehensive way. Our focus is more granular, on particular legal doctrines and their application in specific settings. **1.28**

We do come away from this study with some general observations about how effectively this complex system of doctrine is working. First, we regard plant innovation as being equally well suited for intellectual property protection as other areas of the life sciences. We include in this general observation robust forms of intellectual property protection such as utility patents, which we see as critical in the evolution of plant biotechnology. **1.29**

Second, we urge caution in regards to the laudatory rhetoric that has accompanied some of the plant-specific intellectual property regimes, such as the US plant patent regime and the UPOV-style plant breeders' rights systems. As we see it, plant patents have played a relatively modest role in a particular industry sector (the nursery business) in curbing a particular type of behavior (unauthorized taking of cuttings and their asexual propagation). We have not seen evidence to support more lavish claims that the plant patent system is responsible for enhancing varietal diversity in that sector.³² Similarly, while we are aware of at least one UPOV study claiming that plant breeders' rights systems have stimulated substantial progress **1.30**

²⁹ *Bowman v. Monsanto Co.*, 133 S.Ct. 1761 (2013).

³⁰ See Chapter 11.

³¹ See Chapter 10.

³² The few studies that do exist assign a much less grandiose role to the plant patent system. See, e.g., Paul J. Heald & Susannah Chapman, *Veggie Tales: Pernicious Myths about Patents, Innovation, and Crop Diversity in the Twentieth Century*, 2012 U. ILL. L. REV. 1051 (2012) (arguing that patents have played an insignificant role in innovation in the breeding of vegetable crops, but that the rise of patent protection has not been accompanied by a reduction in varietal diversity); Petra Moser & Paul W. Rhode, *Did Plant Patents Create the American Rose?* (Jan. 4, 2011) http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1735015 (arguing that the American rose breeding industry used plant patents heavily, but those patents played “at best a secondary role” in stimulating the production of new varieties between 1931 and 1970).

in crop agriculture,³³ we are more persuaded by more sober assessments of plant breeders' rights as limited protection against close replication, and as a form of protection that serves as a supplement to utility patent protection in jurisdictions where patent protection is available.³⁴ Indeed, we would favor a comprehensive reevaluation of the roles of both US plant variety protection and US plant patent protection, one that might address the question whether plant variety protection should be extended to cover asexually reproduced varieties, potentially obviating the need for a separate plant patent system.

- 1.31** Finally, we think it self-evident that the study of the impact of intellectual property regimes on plant breeding activities is only beginning. We hope that our book contributes to that ongoing work by providing a foundation in the form of a thorough account of the plant intellectual property jurisprudence.

C. Organization of this Book

- 1.32** Chapters 1 and 2 of this book introduce the subject and provide background necessary to understand how intellectual property rules apply to plants. Following the overview of the relevant legal regimes provided in this Chapter, we introduce many of the technologies that have driven innovation in the plant breeding and plant biotechnology industry (Chapter 2). The discussion found in Chapter 2 will provide the newcomer with a reasonable foundation for further study of both the technology and the legal regimes analyzed in this book. For the veteran, it may also provide a good refresher.
- 1.33** Chapters 3–5 of the book deal with UPOV-style protection regimes, commonly referred to as plant variety protection regimes in the US and plant breeders' rights regimes elsewhere. We offer a brief overview of the evolution of the UPOV and a more detailed look at the architecture of the UPOV Agreement currently in force (Chapter 3). We then provide a more comprehensive analysis of the law of the US Plant Variety Protection Act (Chapter 4). We follow that with a survey of the plant breeders' rights laws of ten jurisdictions, including both UPOV and non-UPOV jurisdictions (Chapter 5).
- 1.34** Chapters 6–9 cover the application of patent law to plants. We begin with the US plant patent provisions (Chapter 6). The plant patent regime is an unusual form of intellectual property, frequently misunderstood and challenging to research. Accordingly, we have provided a thorough analysis of the legal issues that the regime has encountered. Regarding the application of utility patent law to plant breeding and plant biotechnology (Chapter 7), we have of necessity been more selective. We have not attempted to survey the entirety of biotechnology patent law, much less the entirety of patent law. Instead, we have selected aspects of utility patent law that have proven difficult to apply in the context of plant biotechnology and, to a somewhat lesser extent, conventional plant breeding. Due to space constraints, we have said less than we would have liked about the extensive litigation strategy among major seed

³³ UPOV, REPORT ON THE IMPACT OF PLANT VARIETY PROTECTION, UPOV Pub. No. 353 (E) (2005). For a more neutral assessment, see Philip Pardey et al., *The Evolving Landscape of Plant Varietal Rights in the United States, 1930–2008*, 31 NATURE BIOTECH. 25 (2013).

³⁴ One of us (Janis) has been more critical of the effort to attribute patent-like aspirations to plant breeders' rights system, and has also argued that plant breeders' rights systems have not to date responded adequately to technological change. Mark D. Janis & Jay P. Kesan, *U.S. Plant Variety Protection: Sound and Fury...*, 39 HOUS. L. REV. 727 (2002); Mark D. Janis & Stephen Smith, *Technological Change and the Design of Plant Variety Protection Regimes*, 82 CHI.-KENT. L. REV. 1557 (2007). There is a large literature in agricultural economics that touches on these general topics as well.

producers over the *Bt* and Roundup-Ready® technologies. We intend to explore that topic more intensively in forthcoming work devoted exclusively to the “seed wars.”

Chapter 8 surveys utility patent protection applied to plant innovation in major jurisdictions outside the United States. Practice varies significantly among these jurisdictions, and we have attempted to capture and comment on the key differences. **1.35**

Chapter 9 covers licensing issues associated with plant intellectual property. Although such a chapter would not need to be limited to patent licensing, many of the current disputes do involve transactions in patent rights, so we have included the chapter alongside our other chapters on patents. **1.36**

Chapters 10–12 detail the options for protecting plant-related innovation under other intellectual property regimes and related bodies of law. Chapters 10 and 11 cover trademarks (and variety denominations) and trade secrets as applied in the plant breeding industry. Finally, Chapter 12 provides a succinct recitation of the international law regarding plant genetic resources. **1.37**

Preview: www.copyrightedmaterial.com