

# Seed Wars



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**Controversies and Cases on Plant Genetic  
Resources and Intellectual Property**

**Keith Aoki**

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*To Mona*  
*for her patience*  
*and unstinting support and love*



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# Introduction

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Contemporary debate over the legal treatment of plant genetic resources (PGRs) has been described as the “Seed Wars.” The phrase “Seed Wars” as it is used here comes from a *Wall Street Journal* report that refers to the conflict implicating “access to, control over, and preservation of [PGRs].”<sup>1</sup> This book seeks to provide an abbreviated history of events that precede and surround the “Seed Wars” of the past two and a half decades.

Chapter One gives an overview of the major tensions in this area: loss of crop genetic diversity in the 20th century; the rise of industrial agriculture; globalization with the so-called “Green Revolution;” and the intersection of these trends with intellectual property law in the 20th and early 21st centuries. This chapter also raises questions about the relation between technological advances in plant breeding, traditional crop development, and the effect of commodification of plant germplasm (or genotype).

Chapter Two gives a brief overview of plant and seed cultivation, focusing on the treatment of germplasm. The first period is from the 16th through the early 19th centuries, when European colonial powers eagerly sought out exotic plants and seeds to underwrite plantation economies in the equatorial regions of the globe. The key point here is that plants and seeds were not considered the private ‘property’ of individuals, but were instead “owned” (or at least “possessed”) by sovereign nations.

The second period is from the early 19th through the early 20th centuries, when U.S. state and federal governments heavily subsidized the crop plant cultivation and seed distribution. In the last third of the 19th century, through institutions like land grant colleges (LGCs) and state agricultural experimental stations (SAESs), state and federal governments funded research that focused on plant improvement and dissemination of research results to farmers. The USDA used Congressional free franking privileges to send millions of seed samples to constituent farmers annually.

The third period is from the early 1900s to the 1930s, when the primacy of publicly funded breeding and research in this area came under pressure with the re-discovery of Gregor Mendel’s work on plant genetics and the development of crop hybridization to induce higher yields. Private seed companies such as Pioneer Hi-Bred took center stage, as LGC-housed public plant breeding programs were eclipsed and relegated to a complementary role, thus leaving the private seed industry without competition. Finally,

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1. See Jack R. Kloppenburg, Jr. & Daniel Kleinman, *Preface, Plant Genetic Resources: The Common Bowl, in SEEDS AND SOVEREIGNTY: THE USE AND CONTROL OF PLANT GENETIC RESOURCES* [hereinafter *SEEDS AND SOVEREIGNTY*] 1, 2 (Jack Kloppenburg ed., 1988); Jack Kloppenburg, Jr. & Daniel Lee Kleinman, *Seed Wars: Common Heritage, Private Property, and Political Strategy*, 95 *SOCIALIST REV.* 6 (1987). This book uses the term “plant genetic resources” in a broad sense, encompassing anything that contributes to the development or improvement of a new or existing plant variety. This book also uses the terms “seed germplasm” or “germplasm” to refer to seeds, roots, and other plant tissue containing genetic materials.

this chapter discusses the so-called “Green Revolution” brought about by higher-yielding crops and the rise of industrial agriculture as well as the costs in terms of genetic erosion that such high-input agriculture entails.

Chapter Three shifts from developments in the seed cultivation area to developments in intellectual property law. First, this chapter briefly describes the structure of U.S. patent law. To receive a utility patent, an inventor must show that her invention falls within the realm of “patentable subject matter.” The inventor must also show that the invention is “non-obvious,” “useful,” and “novel” — that is, not part of “prior art” in the area. Before 1930, plants (either their genotype or phenotype) were not considered “patentable subject matter” because they were considered “products of nature.” This changed in 1930, when the Plant Patent Act (PPA) passed into law. The PPA made asexually reproduced plants (i.e., reproduced by grafting or cloning) into legally protectable intellectual property matter. Just as importantly, the PPA specifically excluded sexually reproduced crop plants from its scope. The chapter goes on to describe the Plant Variety Protection Act of 1970 (PVPA) that did grant intellectual property protection to sexually reproduced plants that were “novel,” “uniform,” and “stable.” The 1970 PVPA included important exceptions that allowed farmers to save seeds for planting and resale as well as for research.

Both the PPA and the PVPA limited intellectual property rights. In terms of exclusivity of ownership, a utility patent is much stronger—giving (at the time) the patent holder an exclusive right to “make, use or sell” the patented invention for 17 years from the date of issue. Unlike the PVPA, a utility patent does not have exemptions. The issues that the courts would decide next pertained to the scope of patentable subject matter and the eligibility of selectively bred (or genetically engineered) plants for utility patents.

Against this backdrop, the third chapter then describes the development of a series of cases that changed the juridical scope in North America of intellectual property protection for plants. Beginning in 1980, the U.S. Supreme Court held that living organisms could receive utility patents if they met prerequisite requirements. In 1985, the U.S. Patent and Trademark Office Board of Appeals held that genetically modified maize could receive a utility patent and that the enactment of the PVPA did not foreclose this legal option. In 2001, the U.S. Supreme Court once again revisited this area, holding that selectively bred plants could receive utility patents. These cases represent a sea change in the legal treatment of plants. At the beginning of the 20th century, plants (including selectively bred plants produced by farmers and breeders) were legally “products of nature” and part of the public domain. Legally speaking, the genetic information contained in plants was openly accessible. By the turn of the 21st century, however, if a plant breeder met the criteria, she could receive a utility patent in her selectively bred plant variety, which could include particular genomic characteristics of the plant. In other words, intellectual property rights (IPR) could extend not only to the plant phenotype, but to the genotype as well.

Chapter Four describes the emergence from the 1980s of several overlapping legal regimes that attempted to address the status of PGRs. There was a striking shift in the legal treatment of PGRs from the early 1980s to the 1990s. In 1980, with the exception of asexually reproduced varieties protected by the PPA or sexually reproduced varieties protected by PVP certificates, PGRs were considered to be part of the “common heritage of mankind,” and as such were freely appropriable. However, “worked” germplasm was treated as the intellectual property of an individual or a firm. By the mid-1990s, legal treatment of germplasm as “common heritage” had been largely rejected, due in significant part to critics in the developing world that decried PGR appropriation from their

countries, and PGRs were treated as “sovereign national property”—an ironic return to the *de facto* treatment of such resources during European colonialism.

This fourth chapter also describes and explores the several international fora that affect the legal status of PGRs. These include the UN Food and Agriculture Organization’s (FAO) attempt from 1983 to secure a multilateral agreement regarding PGRs, culminating in the 2001 International Treaty on Plant Genetic Resources (ITPGR) that became effective in 2004. These also include the International Union for the Protection of New Varieties of Plants (UPOV), as outlined in its four major iterations in 1961, 1972, 1978 and 1991, the Convention on Biological Diversity (CBD) in 1992, and the Trade Related Aspects of Intellectual Property (TRIPS) of 1994. The CBD and TRIPS have a particularly complex and contentious relationship, which is explored in this chapter. Finally, the chapter also discusses the relationship between changes in U.S. intellectual property law and these overlapping, international regimes.

The fifth and concluding chapter reviews competing theories of property and intellectual property in order to explore which, if any, may help us find acceptable ways to treat PGRs in terms of promoting *in situ* genetic conservation and encouraging more open PGR exchange between seed banks, farmers, and plant breeders. This chapter suggests that the rejection of “common heritage” protection may have been both premature and overbroad. Such treatment in the 21st century may be beneficial, rather than detrimental to the countries of the developing world. Furthermore, this chapter contends that use of “open source” licensing for PGRs, influenced by its success in the software arena, may be an ironic yet highly beneficial way for seed banks to use “private” contract mechanisms to keep open access to PGRs by treating them as a form of “limited” commons.