Germplasm as Property

First the Seed. The Political Economy of Plant Biotechnology, 1492–2000. JACK RALPH KLOPPENBURG, JR. Cambridge University Press, New York, 1988. xviii, 349 pp. $37.50.

Some years back, a revealing poem, entitled "The Tomato Breeder's Prayer," appeared in an unlikely place, the *Western Grower and Shipper* magazine. One stanza confirmed my worst fears about that controversial fruit:

> Resistant, jointless, solid, round
> acidic, scarless, smooth
> we must agree it would be sound
> if they had some flavor, too.

Those few lines encapsulate the recent history of the tomato: how it has been engineered to resist disease and to appeal to the consumer's eye (if not the consumer's palate); but also how it has been remade to endure the impact of a mechanical harvest and to have a shelf life rivaling that of some inorganic groceries. *First the Seed* takes us within the fruit to the seed and beyond the prayer to the political economy of plant biotechnology.

Like other recent writers on the political economy of agriculture, Kloppenburg seeks to challenge prevailing assumptions about the societal costs and benefits of scientific achievements like the "hard" tomato, high-yield hybrid corn, and frost-resistant plants. But this book is far more ambitious because he has two additional goals. First, he wants to show that developments in plant breeding and seed research have influenced enormously the rate and direction of change in agriculture on a national and a global scale. To do that, he must make a clear link between the motivations behind research and experimentation over the years and their outcomes in practice; this topic alone has been the object of enormous debate in agricultural economics. But, second, rather than limiting his analysis to a linear accounting of incremental achievement in agricultural science, Kloppenburg believes that developments in plant breeding must be understood within the political and economic environment that surrounds them. The environment he portrays is one shaped by capitalism; the struggles that attend the birth of a new generation of seeds and new techniques for creating them are the struggles between and, occasionally, among opposing forces in a capitalist economy. Uniting history and political economy in Kloppenburg's view is the battle for control over the seed.

To accomplish these two goals, Kloppenburg offers an analytical framework that borrows heavily from Marxian theory. Analysis at three levels is essential: the level of the object itself or the commodity form that distinguishes the seed as a free good from the seed as a form of private property; the level of the institutions and the division of labor within which the seed is produced and consumed; and the level of the world economy, especially in terms of the physical and economic pool of genetic resources.

As Kloppenburg portrays it, the history of plant breeding has been profoundly affected by the repeated efforts of capital to enter and then reorganize the production of seeds. Capital's relatively late (though seemingly inevitable) domination of seed production was delayed by both institutional and biological factors. In successive eras, merchants, entrepreneurs, industrial corporations, and, most recently, plant geneticists and biotechnology companies have attempted to turn the seed from a public good, freely available to anyone who sought it, into a form of private property, available only for a fee. Up until the mid-1930s, private interests battled with the U.S. government and its extensive system of seed collection and distribution, land-grant universities, and experimentation stations in an effort to reduce barriers to entry into the seed business. With seeds available from prior harvests or public agencies, farmers could retain control over a major factor of production and, though many questioned the usefulness of plant breeding as a science, few looked favorably on the substitution of seed companies for government support.

According to Kloppenburg, hybridization proved to be a powerful tool in transforming the seed from a free good into a commodity. Hybridization—particularly in corn—held two significant attractions. First, it promised and produced dramatic and sustainable increases in yield. Second, and most important to Kloppenburg's argument, it represented "a mechanism for circumventing the biological barrier that the seed had presented to the penetration of plant breeding and seed production by private enterprise" (p. 93). Since hybrid seeds could not be saved and replanted without considerable reduction in yield, farmers who used the seed were forced to go back to the market each season to replenish their supply. With the aid of a supportive Department of Agriculture, seed companies and their financial backers threw their energies into promoting hybrid seed and directing research funds away from the process of open pollination that had allowed farmers to control their own seed. Thus, according to Kloppenburg, a change in breeding technique helped pass control from the farmer to the seed company, and with it went a significant measure of leverage over credit, finance, and other critical factors of production. The impact on the individual farmer, he argues, was magnified by the simultaneous increase in reliance on chemicals and capital equipment. Together they led to a profound restructuring of the American agricultural economy.

More than just being a part of the transformation of the agricultural economy, however, hybridization allowed the U.S. and European seed industries to cement their domination of the world seed market. Kloppenburg describes in exacting detail the asymmetries that have characterized the global transfer of germplasm. Most economically advanced industrial nations were and remain relatively resource-poor when it comes to the basic genetic material that forms the cores of their agricultural economies and, in many ways, their industrial strength. The bulk of that resource resides in the Third World, and global forays for seed have targeted the Third World as the source of new types and exotic varieties. With the advent of hybridization, the capitalization of seed companies, and foreign policy objectives of the era following World War II Third World nations have "found their own genetic resources, albeit transformed by plant breeders, confronting them as commodities. This pattern has been seen as doubly inequitable because the commercial varieties purveyed by the seed trade have been developed out of germplasm initially obtained free from the Third World" (p. 171).

Despite efforts to claim property rights in the raw materials, Kloppenburg argues, Third World nations have had little success in acquiring political leverage or economic rents from the germplasm gathered from within their territorial boundaries. In a classic example of the Marxian concept of "unequal exchange," claims about the value of these raw materials have thus far been stalemated by the alleged value added by seed companies. The seed companies insist that germplasm is and ought to remain a "common heritage" (and therefore be seen as valueless), while Third World nations seek

futilely to attach a price to centuries of value added by primitive agriculturalists and peasant farmers. The irony, of course, is that the principle of "common heritage" was anathema to U.S. companies before the development of hybrid seeds.

Having argued that a change in plant breeding technique made possible significant shifts in the structure of agriculture and the status of the seed, Kloppenburg then proceeds to employ the same analytic framework to assess the latest developments in plant breeding—biotechnology and plant engineering. In three provocative chapters, he suggests that biotechnology is precipitating another redefinition of boundaries between public and private ownership and control over plant breeding. Once again, it is a struggle between publicly funded laboratories and private corporate interests. "Seed" money from the latter, Kloppenburg suggests, levers hundreds of millions of dollars of faculty time, capital equipment, and infrastructure in universities in the direction of what will ultimately become products sold for profit. Moreover, control over both the conduct and the goals of biotechnology research is slipping from the public sector as research scientists in land-grant universities are lured away from the fictional "republic of science" to management and equity positions in budding biotechnology firms. Property rights are once again up for grabs as companies and individuals are lured by the possibility of establishing ownership of plant varieties manufactured in vitro.

Kloppenburg concludes with a strong plea for public oversight and control of research and regulation of property rights for laboratory inventions. He calls for generation of internal debate and critique, akin to that which he suggests developed in physics and later in molecular biology, to chart alternative uses for the technology. Rather than assume that all the changes that issue forth from public and private labs are unequivocally good, he encourages scientists and policymakers to reconsider the broader political and economic effects of hybridization and other "miracles" before unleashing a new generation.

All told, this is an important book. It takes a topic long neglected by even the most avid students of technology and agriculture and renders it open for discussion. Kloppenburg's obvious and passionate concern for informed debate is evidenced throughout the book but especially in his efforts to present the central arguments with sufficient supportive detail. The one major exception to this otherwise consistent practice resides in his treatment of the "choice" between hybridization and open-pollination techniques. In analyzing the impacts of the former, Kloppenburg suggests but never really demonstrates that open pollination constituted a viable alternative. Given the pivotal role assigned to that choice, some readers may question whether the absence of empirical support does not weaken the main argument. Despite this, readers should find much in the way of thoughtful and persuasive challenge to the implicit technological determinism and historicism that have tended to characterize contemporary debates over the opportunities and the dangers of biotechnology.

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The Nuclear Freeze Campaign

From Protest to Policy. Beyond the Freeze to Common Security. PAM SOLO. Ballinger, Cambridge, MA, 1988. xviii, 215 pp. $19.95.

What lessons are to be learned from the Nuclear Weapons Freeze Campaign with its complex mesh of success and failure? Solo provides a thoughtful and fair-minded insider's history with a point of view. She was a founder of the campaign and a major participant throughout, witnessing the struggles over direction and strategy that such campaigns inevitably encounter.

Solo succeeds quite well in avoiding the pitfalls of this kind of insider's history. The issues come through as ones about which intelligent people can disagree in good faith; the book has a generous spirit and is free of back-biting and ad hominem attacks. But Solo has a critical case to make, and she is forthright and open in arguing that the Freeze Campaign took a wrong direction.

Success breeds its own dilemmas. The Freeze Campaign caught on so rapidly that it inevitably attracted mainstream political figures eager to embrace it. In Solo's view, the Freeze was too quick to accept the embrace and insufficiently aware of the opportunity costs. The price for breadth of support was narrowness of vision.

There were many advantages for the Freeze in its alliance with key congressmen, especially through the staff of two members of the Massachusetts delegation, Edward Markey and Edward Kennedy. Although it drew its energy and its ability to be taken seriously from the ability to mobilize grassroots support, it increasingly shifted to an insider's legislative game that left little or no role for collective action. The demobilization that took place from 1984 onward was complex, as Solo recognizes, but part of it, she argues, was a result of the strategic choices made by the Freeze.

The insider game precluded linking the movement to other mobilizing groups, because this would disrupt its mainstream coalition. The issue of preventing nuclear war was not framed in ways that would connect the Freeze with other popular movements—the environmental movement or the movements against nuclear power, apartheid, or intervention in Central America, for example. Supporters of these movements frequently framed their own issues in ways that made such connections.

Calls for modest unilateral initiatives such as a temporary "negotiations" freeze were rejected because mainstream allies feared their vulnerability to charges of "unilateralism." The Freeze provided license to its supporters to vote for new U.S. weapon systems until that glorious day when the two superpowers would mutually agree to adopt the Freeze proposal. There was a want of boldness here in the Freeze that Solo shows us.

Solo's account includes some dramatic reminders of the success the Freeze achieved in helping to shift the direction of U.S.–Soviet relations. Compared to Gorbachev's contribution, the Freeze was a minor factor, but Solo seems justified in claiming that it "changed the issues and the language used by politicians to discuss them." As late as 1983, President Reagan was urging reporters "not to ignore the facts of history and the aggressive impulses of an evil empire." Within a few short years, he was toasting Soviet-American friendship in the capital city of the empire, his admonition buried and forgotten.

I was aware, as an interested observer, that the Freeze had been subjected to Redbaiting, but Solo does an especially impressive job of documenting the extensive, well-orchestrated campaign mounted to discredit it. Private groups such as the American Security Council, the American Conservative Union, and the Moral Majority teamed with administration and congressional opponents in a coordinated effort to present the Freeze as disloyal, or, in the President's words, inspired by those "who want the weakening of America and so are manipulating honest and sincere people."

In the end, Solo argues, the strategy that the Freeze failed to follow is still relevant for the peace movement of the 1990s. Unless the peace movement can alter the terms of the debate "to challenge the deep structures of militarism," it will inevitably be fighting (and mostly losing) defensive battles. Her alternative vision of "Common Security" has its roots in the Palme Commission Report and reflects a developing consensus among