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Agricultural Biotechnology in China

An Unreachable Goal?

Stanley P. KOWALSKI*

I. INTRODUCTION

Recently there has been much discussion about the People's Republic of China's (PRC) investment in and commitment to agricultural biotechnology (agri-biotech). Rapid economic expansion, population growth and technological development are changing the PRC; accompanying these changes is increased demand for high-quality food and fibre. Agri-biotech is optimistically viewed as an important way to meet these demands. Whereas Chinese technological capacity in agri-biotech has advanced significantly over the past decade, it may be unable to meet these challenges. Even when this capacity is combined with good intentions, enlightened policy and large capital outlays, accelerated development of agri-biotech may nevertheless be precluded. Without a reliably enforced system of intellectual property rights (IPRs), the hoped for potential of agri-biotech may never be fulfilled.

II. THE PRC AND AGRIBIOTECH

The leadership of the PRC views self-sufficiency in sustainable food and fibre production as a top national priority (Ding, 2001), and has designated agri-biotech research and development as a major strategy to realize this goal (Holland, 2000). This policy commitment has been implemented via increasing investment (Pray *et al.*, 2002). Under the National Program on the Development of Basic Research (the "973 Program") and the Ministry of Science and Technology sponsored "863 Program", investment in agri-biotech research and development has increased from US\$ 8 million in 1986, to US\$ 112 million in 1999 (Huang *et al.*, 2002), with some estimates of the 1999 figure as high as US\$ 300 million (Kalaitzandonakes, 2000; James, 2002a), to approximately US\$ 350 million in 2000 (Holland, 2000), and then a commitment to further increase this investment to US\$ 450 million by 2005 (James, 2002a). Since 1996 there has been a steady increase in the total production of transgenic crops in China, with the 1.5 million hectares under cultivation in 2001 (James, 2001) increasing to 2.1

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million hectares under cultivation in 2002 (James, 2002b). The economic stakes are high: projected economic returns from investment in agri-biotech for rice and soybeans alone are estimated at over US\$ 1 billion annually (Anderson and Yao, 2001).

Several factors drive agri-biotech policy in the PRC. A growing population, with increasing affluence and a preference for dietary animal protein, has generated increased demand for feed grain, which is, however, complicated by a continuing loss of arable land. Projections generally concur that by 2030 the PRC's population will stand at 1.7 billion (Cai, 1990; Michalski *et al.*, 1996; Zhang, 2000). A steady rise in per capita income, at 2.5 to 4.5 percent annually, is also likely (Michalski *et al.*, 1996). Due to this continued economic growth and its attendant societal affluence, the Chinese diet has expanded, with an increased demand for animal protein. In 1996, the PRC's average per capita consumption of animal protein was approximately half of Taiwan's (Lumpkin, 1996)—the two share nearly identical culinary cultures (Lumpkin, 1996). Consistent with the PRC's continued development and its culinary preferences (comparable with Taiwan's), the per capita demand for animal protein is projected to double between 1996 and 2020 (Lin *et al.*, 1996; Pray and Fuglie, 2001). As a consequence, demand for feed grain is projected to nearly triple between 1996 and 2020 (Lin *et al.*, 1996; Pray and Fuglie, 2001). Finally, and disturbingly, there is a steady loss of arable land in the PRC, the result of erosion, salinisation, desertification and urbanization (Lin *et al.*, 1996; Zhang, 2000). The net rate of loss is alarming, estimated at 300,000 hectares per year (Cai, 1990). When taken together, the convergence of the afore-mentioned factors indicates that dynamic development and deployment of advanced agricultural technology, such as agri-biotech, will remain critical for the PRC's continued food security (Lin *et al.*, 1996).

III. INTERNATIONAL TRANSFER OF AGRIBIOTECH TO THE PRC

International transfer of agri-biotech can accelerate sustainable growth of agri-biotech capacity in developing countries (James, 1996); a reliable system of IPRs can facilitate this by creating an IPR-supportive atmosphere that encourages industrialized-nation-based agri-biotech corporations to develop and license innovations, such as tropical and sub-tropical genetically-enhanced crops and other suitable applications, which would be appropriate to the specific needs of developing countries (Kryder *et al.*, 2000; Boyd *et al.*, 2003). However, since "developing countries" span the development continuum (Kowalski and Kryder, 2002), improved IPR protection will help some to progress, but for others will have little positive impact (Maskus, 2000). The benefits of IPRs are realized in countries where foreign direct investment, openness in the economy and human and physical capital accumulation gel (Maskus, 2001). In such countries, effective implementation and enforcement of IPRs will foster the next level of development. In the continuum of developing countries, the PRC appears to be positioned such that IPR capacity could be approaching this stage (Lesser, 2002).

Furthermore, it is highly likely that the PRC is at the point where imported agri-biotech will significantly promote the development and deployment of appropriate agri-biotech applications to meet current and future challenges in food/fibre production. Such reliance on the importation of technology is typical in the development of nations (Maskus, 2000), and the PRC has followed this route (Allison and Lin, 1999). The necessity of international agri-biotech transfer is underscored by the fact that corporations from industrialized countries dominate the world's agri-biotech industry (Huang *et al.*, 2002; Kowalski and Kryder, 2002; Boyd *et al.*, 2003). Therefore, the PRC has much to gain via agri-biotech transfer partnerships, executed by licensing agreements with these corporations. However, as with other developing countries at a similar level of IPR capacity maturation, the question the PRC shall face is whether it is willing (or, perhaps, indeed able) to enforce IPR protection in agri-biotech (Boyd *et al.*, 2003).

The PRC's nascent collaborations with industrialized-nation-based agri-biotech corporations have been limited—for example, Pioneer's collaboration with the Cereals Breeding Institute on maize research; Pacific Seeds' collaboration with the Provincial Academy of Agricultural Sciences on rapeseed/canola research (Pray, 1999); and the Monsanto/Delta and Pineland collaborative project with the Chinese National Cotton Research Institute to move Bt cotton varieties to the PRC (Pray *et al.*, 2002). The most noteworthy and well-documented case has been the Monsanto project, where commercialization led to distribution of suitable varieties to smallholder cotton farmers throughout the northern PRC (Pray *et al.*, 2001). The spread of these varieties was rapid, with broad acceptance and significant success (Huang *et al.*, 2002). The estimated aggregate monetary benefit to the nation was US\$ 750 million in 2001 (James, 2002b). In spite of this, Monsanto earned only small returns on its investment, which is, at least partially, attributed to poor IPR protection (Pray *et al.*, 2001). Monsanto, as well as other agri-biotech corporations, will carefully scrutinize inadequate protection of their IPRs, which will then influence decisions as to future agri-biotech transfer to and investment in the PRC (Rozelle *et al.*, 1999).

IV. IPRS IN THE PRC: ENFORCEMENT AND THE JUDICIARY

Although laws are in place and international treaties acceded to, the PRC's current regime of IPR law enforcement is still inadequate. The PRC's December 2001 accession to the World Trade Organization (Ding, 2001) obligates it to comply with the provisions written into the Trade-Related Aspects of Intellectual Property Rights (TRIPS) Agreement (Clark, 2000). TRIPS, as an attempt to internationally harmonise IPR law consistent with the standard in industrialized countries, defines the minimum standards of IPR protection for developing countries (Petherbridge, 2001); compliance includes establishing IPR protection for agri-biotech products and processes (Maredia *et al.*, 2000). With respect to appropriate IPR laws on the books, the PRC is already largely TRIPS-compliant; enforcement, however, remains a problem (Clark, 2000). The PRC's

commitment to IPR protection, at least on paper, is not limited to TRIPS. In 1980 the PRC joined the World Intellectual Property Organization, in 1985 the Paris Convention for the Protection of IPRs, in 1999 the International Convention for the Protection of New Varieties of Plants (UPOV), in 1993 the Convention on Biological Diversity, and in 1985, the PRC enacted its own patent law, followed by further amendments in 1992 and a major revision in 1993 (Ding, 2001). However, as with TRIPS, having laws on the books does not necessarily imply enforcement, which is a problem with IPR protection across the board in the PRC (Yu, 2000).

In the PRC, enforcement of IPR law ranges from sporadic to non-existent (Yu, 2000); although the reasons for inadequacies in enforcement are multiple, one appears fundamental. For IPR infringement in the PRC, penalties are weak: fines are low and few infringers are ever incarcerated. There is poor financial support for IPR administration and enforcement (Clark, 2000), a lack of properly trained professionals to function as lawyers and judges (Orts, 2001), and many local officials do not understand the importance and urgency of IPR enforcement. Local protectionism and corruption is also widespread (Yu, 2000). While these barriers to proper enforcement are important, they are, in an important sense, ancillary. As one excavates through them, the fundamental issue is uncovered: the Chinese Communist Party (CCP) continues to control and dominate the judiciary. Judges, subservient to the CCP's rule, are subject to "ideological discretion" as directed by the CCP (Orts, 2001). There is no independent judiciary in the PRC (Palmer, 2001). This is further corroborated by the Corruption Perceptions Index (CPI, 2002), which "represents a systematic effort to quantify aspects of the application of the law in a diverse group of countries." (Lesser, 2002). Of 102 countries surveyed, the CPI ranks the PRC at 59, just below Colombia, and together with the Dominican Republic and Ethiopia.

Judges in the PRC are elected or appointed by People's Congresses, dominated by the policies of the CCP and reminded that judicial influence and the CCP's leadership must remain consistent. Regardless of what IPR laws are on the books—and many are—judges do not primarily hold to the supremacy and rule of law, rather the most important juridical qualification is a firm political stand, with adherence to the Four Basic Principles of:

- Marxism–Leninism–Mao Zedong Thought;
- dictatorship of the proletariat;
- the Socialist road; and
- leadership of the Party (Wang, 1998).

As a consequence, the civil-law judiciary system in the PRC is highly politically influenced and unlikely to render any decision in opposition to the central government, with the result that the actual power of the courts is significantly diminished (Haskins, 1999).

In the PRC, the CCP's domination of the judiciary obfuscates the enforcement of IPRs. For the PRC's judiciary, the absence of truly independent judicial review renders

its credibility questionable, as it is influenced by the ever-present, shifting political agendas of the authoritarian CCP. Lack of judicial independence fosters a climate of arbitrariness, which is the antithesis of the rule *of* law. Essentially, the situation in the PRC can more accurately be described as the rule *by* law, that is, “the use of law as an instrument of rule rather than a set of independently applicable legal principles.” (Palmer, 2001). This, in turn, creates a sense of uncertainty *vis-à-vis* IPR protection that will likely cause industrialized-nation owners of agri-biotech to be reluctant to risk licensing and transfer of their valuable, proprietary agri-biotech. Having laws on paper without a proper political or social infrastructure for enforcement will lead to persistent problems. To sum it up, if the PRC is unable to consistently and predictably protect the civil, political and property rights of its own citizens, it is unlikely that it will be able to protect the even more sophisticated rights, such as IPRs, of foreigners (Palmer, 2001). Owners of agri-biotech are aware of this.

V. POTENTIAL CONSEQUENCES OF WEAK IPR ENFORCEMENT ON AGRIBIOTECH DEVELOPMENT IN THE PRC

Since a system of reliably enforced IPRs is essential for successful international agri-biotech transfer, inadequate IPR enforcement in the PRC could be a significant constraint to full utilization of agri-biotech. For continued, successful participation in the global economy, the PRC requires both a favourable economic climate and a reliable legal system, the two actually being “married”. Due to the increasing interdependence of these two in international technology transfer, any country that desires to be a full participant (and a full beneficiary) will need to comply with international standards of IPR protection (Palmer, 2001). Foreign corporations will, otherwise and understandably, be reluctant to risk licensing and transferring their proprietary technologies (Allison and Lin, 1999; Palmer, 2001), including the latest advances in agri-biotech (McCabe, 1998).

Such an IPR/technology-transfer impasse will be further exacerbated by the fact that the licensing of IPRs is decreasingly “stand-alone” patent licensing and more and more patent/trade-secret “hybrid” licensing (Lemley, 2001; Bleeker *et al.*, 2003). A patent essentially represents the tip of the IPR-iceberg, with trade-secrets hidden under the surface as ongoing technology transferred, i.e. the “workhorse of technology transfer” (Jorda, 1999). Accordingly, a strongly enforced IPR system, which *de facto* necessitates a credible and independent judiciary, is essential for such complex licensing agreements and partnerships. A rock-solid foundation for sustainable technology transfer relationships can thereby be constructed (Kowalski *et al.*, 2002). On the other hand, by failing to adequately enforce IPR protection, the PRC will likely be limited to second-tier technology (Kowalski and Kryder, 2002), behind global standards and possibly nearly obsolete (Maskus, 2000). The PRC will thereby be precluded from accessing the latest advances in agri-biotech (McCabe, 1998). Finally, and critically, in addition to

increasing foreign investment and technology transfer, a system of reliably enforced IPRs will also foster indigenous research, development and commercialization in technology appropriate to a developing country's needs and markets, for example, agri-biotech in the PRC (Maskus, 2000; Yu, 2000).

The PRC's expressed agenda regarding agri-biotech and its current IPR enforcement regime are contradictory; that is, there is a disconnection between government policy/investment and the current state of the PRC's legal system. Although necessary, policies promoting and supporting agri-biotech are, by themselves, insufficient (Allison and Lin, 1999). Moreover, whereas the PRC is increasingly integrated into the global economy, it is at the same time, and paradoxically so, still operating under a legal regime that is dominated by the "rule of man" and not the "rule of law" (Sender, 1999). Indeed, a legal system alone does not necessarily imply rule of law. The CCP's continued domination of the judiciary in the PRC generates a fundamental incompatibility between a reliable system of IPR enforcement and the current political organization (Wang, 1993; Orts, 2001). As a point of comparison, this incongruity between the policy commitment to agri-biotech and the lack of capacity requisite for international agri-biotech licensing and transfer is roughly analogous to the 1997 Asian financial crisis, wherein rapid financial developments outpaced institutional capacity, creating an economic and financial crisis (Sharma, 2002). Similarly, due to a lack of juridical/institutional IPR enforcement capacity, the ambitious government policy objectives for agri-biotech in the PRC may be unattainable, with long-term consequences that are difficult to predict.

VI. CONCLUSIONS AND RECOMMENDATIONS

In the PRC, with the food security of over one billion people to consider, a careful re-examination of current institutional roles, structures and priorities may well be timely and judicious. Weak enforcement of IPRs, a major concern for industrialized-country-based corporate owners of agri-biotech (Rozelle *et al.*, 1999), could significantly attenuate the flow of advanced agri-biotech into the PRC. This will likely continue until reliable and convincing changes are made, affecting transition to an independent judiciary that credibly and consistently enforces the PRC's IPR law, a lot of which is already on the books. Such fundamental changes in policy necessarily occur at the national level (Maredia *et al.*, 2000)—in the case of the PRC, the central government in Beijing. Change can be measured. For example, the gradual transformation of the Taiwanese judiciary towards greater independence has followed economic, business and technological development over several decades (Wang, 1998).

Whatever the mode or schedule, changes must nonetheless be prioritized. As either a national institution (Orts, 2001) or national infrastructure (Sherwood, 2002), IPRs are essential to economic development. However, when an enfeebled judiciary cannot

enforce IPRs, the benefits of technology transfer and development are lost, which, in turn, leads to other, considerable, losses to a country (Sherwood, 2000). Although a developing country might realize a limited benefit from refusing to comply with internationally recognized standards for IPR protection in the short term, any longer-term benefits are dubious at best, and likely outright inimical to fully accessing and utilizing suitable advanced technologies for the development and production of crops that these same countries increasingly need (Boyd *et al.*, 2003).

To play any game, it is not enough to just have a rulebook. One also needs to demonstrate respect for and compliance with the rules. Agri-biotech development and deployment in the PRC has been prioritized as a vital national objective. However, IPR enforcement, a critical factor in international technology transfer and domestic technological progress, is not a game—it is a serious state of affairs. The stakes are high, time is limited and demands are converging. In the PRC, enforcing IPRs will advance national policy, strengthen agri-biotech development, enhance food security, and, generally, just be good for business.

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