

## Public Research in Plant Breeding and Intellectual Property Rights: A Call for New Institutional Policies

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Intellectual property rights (IPRs) are being introduced or strengthened in developing countries as a result of the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) of the World Trade Organization (WTO), bilateral trade negotiations, and pressure from export-oriented sectors in agriculture. IPRs in agriculture provide a temporary exclusive right on the commercialization of the protected subject matter (the invention) and are meant primarily to stimulate investment in breeding and seed supply.

Different IPRs are available to the plant-breeding sector: plant breeder's rights, patents, and trademarks are important; trade secrets and database protection may play a role in specific fields. According to TRIPS, countries can choose between patents and "an effective *sui generis* system" for protecting plant varieties. Very few countries (e.g., the United States, Japan) currently provide strong patent protection to varieties; most opt for plant breeder's rights. Many biotechnological inventions are, however, patentable, and the scope of these patents may include varieties.

Research managers and policymakers responsible for public research, who are commonly in favor of using IPRs in public sector breeding, have to consider the potential impact on breeding strategies and on the costs and benefits before giving their unconditional support to IPRs in plant breeding and their use in public agricultural research.

This brief is based on a study on the impact of IPRs in the breeding industry in developing countries executed in 2004 for the World Bank (Louwaars et al., 2005).

### EMBRACING IPRs

There are three main reasons for national agricultural research institutes (NARIs) to embrace IPRs:

- Recognition
- Technology access and transfer
- Revenue

In commercial breeding, the last reason prevails; IPRs create additional value for the plant variety by providing a legal basis for license contracts between the breeder and seed producers, commonly including a royalty payment. IPRs are thus an important tool to recoup the investment in research. In public research, however, variety development is paid from public funds and research managers tend to put some emphasis on the other objectives, too. IPRs formally link the variety to the institute and individual breeders (recognition); furthermore, they may facilitate seed production when only an exclusive market will entice an individual seed producer to take a new variety into its product range (to facilitate technology transfer), and technology may be more easily acquired if patents can be traded.

However, given the declining public funding of agricultural research in many countries, revenue generation is an attractive option for many public institutions.





Income from IPRs can—if the institution does not have to surrender it to the treasury—support the institution to cover operational costs and even hire additional staff, and provides managers with a financial tool to support particularly innovative researchers or research groups. Public varieties can generate a ready income, especially if varieties developed in the past can be protected.

## **IMPACT ON BREEDING STRATEGIES**

Introducing the concept of revenue generation in public plant breeding is likely to have an impact on the distribution of funds within the NARI and on the breeding strategies applied. Since IPRs can be generated in plant breeding relatively easily compared with other sciences, the pursuit of revenue could lead to important disciplines such as soil science, social sciences, and plant pathology being marginalized or downgraded to supporting only breeding efforts.

A second possible impact is that funds will be distributed more to crops with a high value in seed production. These are, in general, crops that are produced for the market (where investment in seed is common), that are difficult to reproduce on-farm (e.g., cross-fertilizing crops), and that have a low seed rate (seed is a small part of total production costs). In practical terms, this means that maize-breeding programs will get priority over those for open-pollinated small grains, most pulses, and root crops. The latter crops, however, may be important for the nutrition security of large parts of the population.

The third level of impact is within breeding programs themselves, where researchers have to choose which ecological areas or client groups to target. Revenue generation will focus breeding on commercial farmers and hybrids rather than on resource-poor farmers and open-pollinated varieties, where the seed industry is unlikely to generate profits and pay royalties to the breeder.

The shift to commercial crops and farmers may be consistent with recent changes in national agricultural policy and trends of commercialization of public entities. In other countries, however, the public task of NARIs is based on supporting both equity and national agricultural production. The trend toward crop diversification

and breeding for low-input agriculture may be reversed when NARIs focus on using IPRs for revenue generation. Another strategy of a NARI may be to secure a choice of varieties for farmers in a market that may otherwise be dominated by large commercial firms owing to IPRs. However, this latter option also may shift research priorities away from smallholder farmers' needs.

Policymakers and research managers need to carefully consider the impact of the use of IPRs in public breeding before including protection in their research strategies. If NARIs are not supposed to protect their inventions, governments will have to provide the necessary funds for research.

## **IMPACT ON THE NARI ORGANIZATION**

### **Protecting Own Intellectual Property**

When a NARI intends to commercialize its varieties using IPRs, it must realize that the right holder is responsible for implementing his or her right and that the NARI needs capacities to design commercialization strategies and license contracts, and to follow up on these contracts. Most NARIs are not used to employing marketing staff and intellectual property (IP) specialists. Their focus on research means they have little experience in attracting or administering appropriate personnel to manage their IP portfolios.

In addition, research managers tend to look at the benefits derived from IPRs rather than the costs. Besides the costs of additional personnel, the direct costs of acquiring and implementing IPRs may be substantial. Application and maintenance fees can be considerable, and commercial decisions have to be made on which rights to apply for and when to surrender them. An even more significant cost can arise when the rights have to be defended, especially against experienced negotiators of commercial companies with significant resources. NARIs should be prepared to spend money on protecting IP.

### **Managing Third-Party IP**

Even if the NARI does not intend to protect its own inventions, the introduction of IPRs may have a significant impact on the organization. While plant varieties are in almost all cases freely used as parents in further



breeding, this is not the case in patented (bio)technologies. Hence, NARIs will need to develop ways and means to observe rights on technologies and materials that they use in breeding. Most countries (with the exception of the United States) have a fairly liberal “research exemption” in their patent laws, which means that patented technologies can be freely used in research, but as soon as the research leads to a product, the rights of the patent holder have to be recognized and consent must be sought. This commonly leads to a license contract in which the patent holder can specify the uses, the ways of commercialization, and benefit sharing (royalty payment). Before a research product leaves the institute, a thorough IP audit may be necessary to avoid claims.

NARIs thus need to identify possible risks associated with the use of patented technologies. An IP plan needs to be developed for each project, in which it is decided when and how contact will be established with the technology provider (i.e., whether to ask for a research license or wait until a product is developed; whether to protect the NARI’s own inventions; and how its innovations may be commercialized). This plan starts with a patent search to establish rights over technologies used. Although most biotechnologies are not protected in developing countries, this is changing rapidly for large countries like China, India, and Brazil, and may also change for a range of least developed countries.

This analysis may lead to a search for alternative technologies (or genes) that may be in the public domain and that may serve the research objective as well. If that is not feasible, the next step is to get approval to use the protected technology. This requires a negotiation capacity that is commonly not well developed in public institutions. License contracts may also include a requirement to monitor the market for the technology on behalf of the patent holder, which may be difficult for a NARI.

The introduction of IPRs introduces new tasks and responsibilities to the NARI. It requires not just access to lawyers, IP specialists, negotiators, and marketers, but more important, it calls for a shift in “culture” among the researchers. All researchers will have to be aware of the potential impact of IPRs on their work, when they commonly prefer to concentrate on their own science and not be bothered by “administrative rules.” Senior

management will have to lead the way in this gradual shift, assisted by well-designed capacity-building initiatives and support systems.

## IMPACT ON INTERNATIONAL AGRICULTURAL RESEARCH

The same considerations are important in international agricultural research. Strategies for protecting inventions by the International Agricultural Research Centres (IARCs) concentrate on the technology transfer argument on the one hand and the original objective to develop international public goods on the other. Several IARCs are developing agribusiness parks or other mechanisms to link them directly with the private sector to provide additional routes for technology transfer. There are, however, also cases in which IARCs obtain research funds for developing varieties jointly with the private sector or obtain royalties on the commercialization of varieties.



Another challenge for IARCs is to get access to protected technologies without diminishing their primary task of poverty alleviation. Materials and tools may not be used in research if the products cannot be made available to the target groups of the centers (i.e., “the poor”) without restrictions. Humanitarian licenses and cooperation agreements (e.g., of the Generation Challenge Program consortium) should at least contain such provisions.

A less debated result of the spread of IPRs on IARCs is the impact of the commercialization of some NARIs on the capabilities of IARCs to reach the resource-poor. NARIs that will concentrate their strategy on revenue generation through IPRs and thus move away from producing solutions for resource-poor farmers in favor of commercial production may not always be suitable partners of IARCs for reaching the poor. The latter may need to look for other ways, for example, through non-governmental organizations and in some cases, direct contacts with seed producers.

## INSTITUTIONAL STRATEGIES

Public research institutions have to include aspects of IP in their strategies on the basis of their mission and mandate. Clarity about the position of the institution is important for internal and external use. It will help to create a coherent attitude by NARI staff and a clear position in its relation with partners. These institutional strategies may include, for example, answers to the following questions:

- Should maximum restriction levels be set for accessed protected technology?
- Should the research exemption be used or research licenses requested?
- Should foreign technologies that are not protected in the country be licensed?
- Should the NARI's own inventions be protected or not (commercial or defensive protection)?
- Should the NARI be protected nationally and abroad?
- Should licensing strategies be exclusive or not, and if so, to what kinds of partners?

- How should the NARI maximize income?
- How dependent on such income does the NARI want to be?

Such strategies require a thorough analysis of the mission and mandate of the NARI and the environment in which it operates. The strategies also need to be linked with national strategies toward funding arrangements for research.

## CONCLUSIONS

Policymakers and research managers have to be aware of potential difficulties of matching revenue generation through IPRs and the public tasks of the NARIs. Explicit national and institutional policies are needed to guide choices regarding the management of IPRs in breeding.

Research institutes have to prepare for managing IPRs, whether they intend to protect their own inventions or not. Human and financial resources have to be made available, and the institutional culture has to be adapted to the new developments.

## REFERENCE

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