Technology Transfer

If you build a better mousetrap, the old saying goes, the world will beat a path to your door. But government inventors will tell you that much of the time, it just isn't so. True, there have been a few instances in which processes or inventions from the four ARS regional labs have been adopted with lightning speed by U.S. industry, but they are the exceptions, not the rule. The Western lab's development of dry caustic peeling of fruits and vegetables is one example of instant acceptance; California canners had been holding their collective breath, praying for a new process that would enable them to meet tough new State standards on disposal of processing wastes. Improved textile processing machinery, invented at the Southern lab in the 1950's, was also adopted quickly. That was a result of the practicality of the inventions and the close working relations between SRRC engineers and the textile industry during the period of development. The same could be said of dehydrated potato flakes, which had been carried by ERRC researchers clear through the pilot plant stage.

In far too many cases, however, it is a painfully slow process to transfer technology developed in the laboratory to commercial manufacture. A 10-year lapse between an invention and its adoption is far from unusual, and occasionally, what looked like a first-class innovation languishes decades later on a laboratory shelf. There may be any of several reasons for slow acceptance. Industry may have such a big dollar investment in current plant and equipment that it hesitates to junk it, even for what might be a superior process. Or it may foresee that a new invention will require years of further development before it is marketable and decide not to take the risk. Occasionally, changing costs of raw materials mean that the product in question can be made more cheaply in some other way. Or the economy may be in a slump and new investment capital hard to come by. Or a skeptical industry may distrust the results of government research, any government research. More frequently in the past, however, an industry failed to adopt a new regional lab invention because it didn't want to share it with other manufacturers.

Until 1980, it wasn't lawful for a Federal research agency to award a manufacturer a license for exclusive use of a Government patent. But Congress in that year passed important pieces of legislation to facilitate technology transfer. Under the Patent Law Amendments, Federal agencies for the first time were granted the authority to award exclusive licenses to private business firms to use inventions patented by the Government.

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Exclusive licensing means that the Federal Government can give one company—or a limited number of companies—the sole right to use research developed and patented by a Federal agency like the Agricultural Research Service. Without the protection afforded by exclusivity, a company might have little financial incentive to invest heavily in an ARS invention. It takes time and money for an industry to commercialize an invention—and more time and money to establish markets for it. Without the protection of exclusive licensing, another company could take the same ARS-based technology and compete in the same markets without having assumed any of the early risks. As word got around about the benefits of exclusive licenses, the number of applications from industry increased sharply.

The increased attention to technology transfer from Congress and the Executive Branch is attributable in part to foreign competition. Industry in several foreign countries has made good use of U.S.-financed research, including several inventions developed

Working under a cooperative agreement with the Biotechnology Research and Development Corporation of Peoria, Paul Bolen, an NRRC research geneticist, analyzes the DNA of yeasts in a search for new vehicles to move genes from one microorganism to another. "We're beginning to envision a way to create marketable products inexpensively through fermentation, using genetically engineered yeasts," says Bolen.

by the ARS regional laboratories. In too many instances, foreign companies applied ARS inventions before a single American industry adopted them. More than once, foreign industries have sold U.S.-invented products back to us. Congress was deeply concerned about this, as were American scientists.

Some critics complain that exclusive licensing means that research funded by the public is used for the benefit of the few. But without exclusive licensing, some ARS research results might not get to the public at all. When an invention remains unapplied, or is manufactured overseas, no American benefits. When a U.S. business investment is protected by an exclusive license, the public ultimately gets the most for its research dollars. Further, a company must pay a royalty fee to the government for exclusive use of the patent.

The Agricultural Research Service continues to license selected patents on a nonexclusive basis, which means that they are available to any company capable of making and marketing them. With each patent granted, the agency decides whether exclusive or nonexclusive licensing is the best way to get the technology used. The decision hinges mainly on the amount of capital investment necessary to turn the invention into a marketable product.

The major boost to getting ARS inventions adopted came with passage in 1986 of the Federal Technology Transfer Act. This law makes it legal for Government research facilities to accept, retain, and use the funds, personnel, services, and properties of cooperators. In other words, industries can put their money and scientists into an ARS regional lab and work with scientists there to help develop a process or invention into something closer to what industry needs. Also, industries can make advance commitments for exclusive licensing of the products under development. The mechanism provided by the 1986 Act for this new Government-industry cooperation is the Cooperative Research and Development Agreement, or CRADA. As a result, several new and improved products have already reached the market. These include a kit to test for plant viruses, an improved scientific instrument, and a method for in-embryo vaccination of poultry.

One CRADA in Peoria is with a consortium of several major industries and the University of Illinois, who have agreed to work with the Northern lab on research on biotechnology, an exciting frontier for industrial development. The 1986 law encourages this kind of three-way cooperation on research among industry, Federal research facilities, and universities.

Another way to get more technology transferred is to make more information about ARS research known to industry. The agency maintains a technology transfer database called TEKTRAN (Technology Transfer Automated Retrieval System). By early 1991, TEKTRAN contained more than 12,000 brief, easy-to-read summaries of the latest ARS research results, including many from the four regional research labs. These are prepublication notices of research results already reviewed by a scientist's peers and cleared by ARS management. About 400 new findings are added to the ARS database each month. In addition, information on USDA patents is available online from AGRICOLA and by late 1991 was to be added to TEKTRAN as well.

In addition, information about ARS patents available for licensing is published in an Agricultural Inventions Catalog, which is updated periodically. Key inventions are also publicized in press releases, quarterly reports of significant research, and *Agricultural Research*, a monthly magazine published by ARS. The research agency is doing everything possible to make sure that the public knows about key government inventions and processes.

For a time, USDA inventions were licensed solely by the National Technical Information Service (NTIS), an agency of the U.S. Department of Commerce. In response to heavy demand from industry, however, the Agricultural Research Service in 1989 established an inhouse licensing program to supplement the NTIS.

ARS researchers also have new incentives to get their inventions patented. The agency's patent program has been consolidated into a single unit, and scientists now have a much better understanding of the new requirements and benefits of the patent program. Improved opportunities for moving their discoveries into commercial use have stimulated ARS scientists to file more invention reports, the first step in exploring the possibility of securing a Government patent. In 1987, ARS researchers filed 76 reports; in 1988, 139; in 1989, 140. In 1990, with enthusiasm mounting for the new programs, 150 invention disclosures were submitted, many of them from the regional laboratories. Much of this new interest in getting patents stems from the fact that in 1989, ARS researchers earned $60,000 as their share of licensing fees and royalties from their inventions. In 1990, these awards totaled more than $95,000.

There is also a new ARS awards program. Scientists responsible for the successful transfer of new technology, whether patented or unpatented, can each receive prizes of from $500 to $2,500. In 1990, nine ARS scientists were awarded a total of $9,000. There is good reason for excitement about the future of technology transfer.