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Intellectual property rights encourage private

by Keith Fuglie, Cassandra Kloitz, and Mohinder Gill

Figure 1. Private investment in plant breeding reached \$470 million in 1994

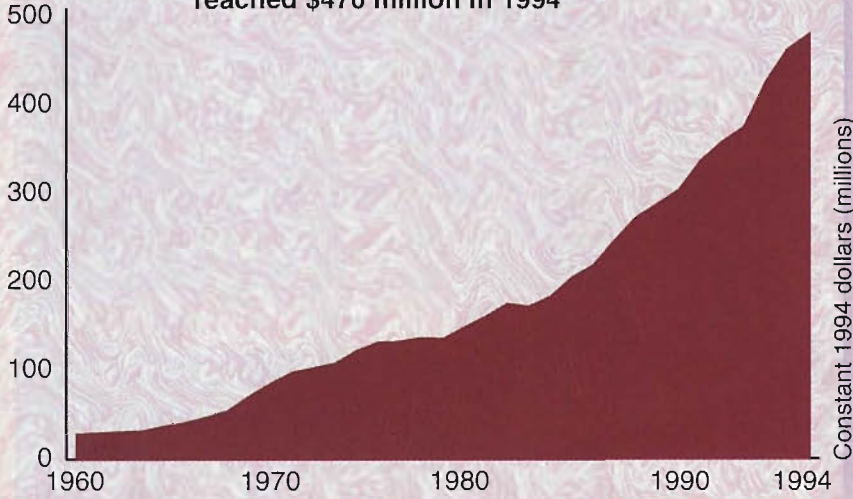
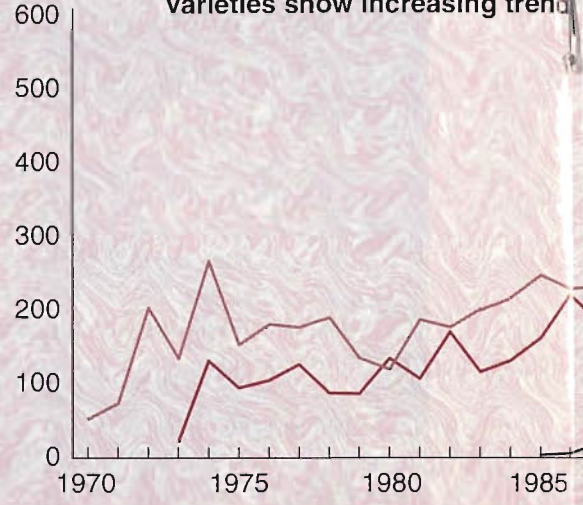


Figure 2. Intellectual property rights issued in plant varieties show increasing trend



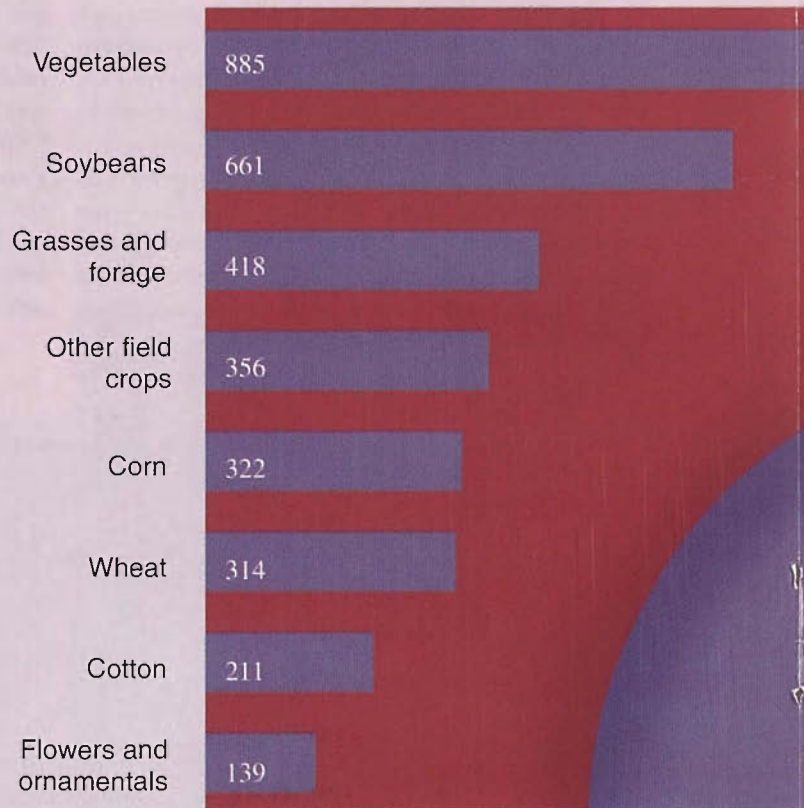
PVPC = Plant variety protection certificate

Since Henry Wallace first developed hybrid corn in the 1930s, private plant breeding has made significant contributions to varietal improvements. Private investments in breeding of both hybrid and nonhybrid crop varieties now extend to virtually all major field crops. Estimates show that annual research expenditures by private seed companies increased dramatically, from about \$27 million in 1960 to \$470 million in 1994 in constant dollars (figure 1). By comparison, the public sector spent \$1.1 billion on all crop research in 1994. Expanded intellectual property rights (IPRs) for biological inventions contributed to the growth in private sector plant breeding efforts during the past several years.

IPRs encourage research by giving an inventor exclusive rights to use an invention for a specified period of time. Until recently, biological inventions were considered “products of nature” and not afforded legal protection under U.S. patent laws. This discouraged private investment in plant breeding, with the exception of hybrid crops. Hybrid seed offers a natural way to protect intellectual property since it cannot be reproduced without access to parental lines. Therefore, farmers need to repurchase hybrid seed each year. Prior to the late 1960s, nearly all private plant breeding focused on hybrid seed. Corn, sorghum, sunflowers, and, to some extent, wheat are the only field crops for which hybrid seed is commercially viable in the United States. Other crops continue to be produced almost exclusively from nonhybrid, or open-pollinated seed.

Congress first established plant breeders’ rights for new plant varieties in 1930, when it created a special category of patents, called “plant patents,” for vegetatively reproduced plants. This legislation mainly affected fruit and nut crops, and ornamentals. Plant breeders’ rights weren’t available for crops grown from seed until Congress enacted the Plant Variety Protection Act (PVPA) in 1970. The PVPA was amended in 1980 to cover vegetables. Amendments in 1994 extended the duration of coverage from seventeen to twenty years, eliminated the “farmer exemption” (the right to sell a part of one’s crop as seed), and tightened the rules governing the use of protected germplasm in breeding programs.

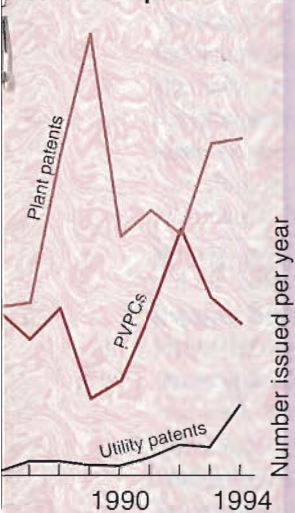
Figure 3. 3,306 plant variety protection certificates were issued between 1970 and 1994



*Sum ex

Investment in plant breeding

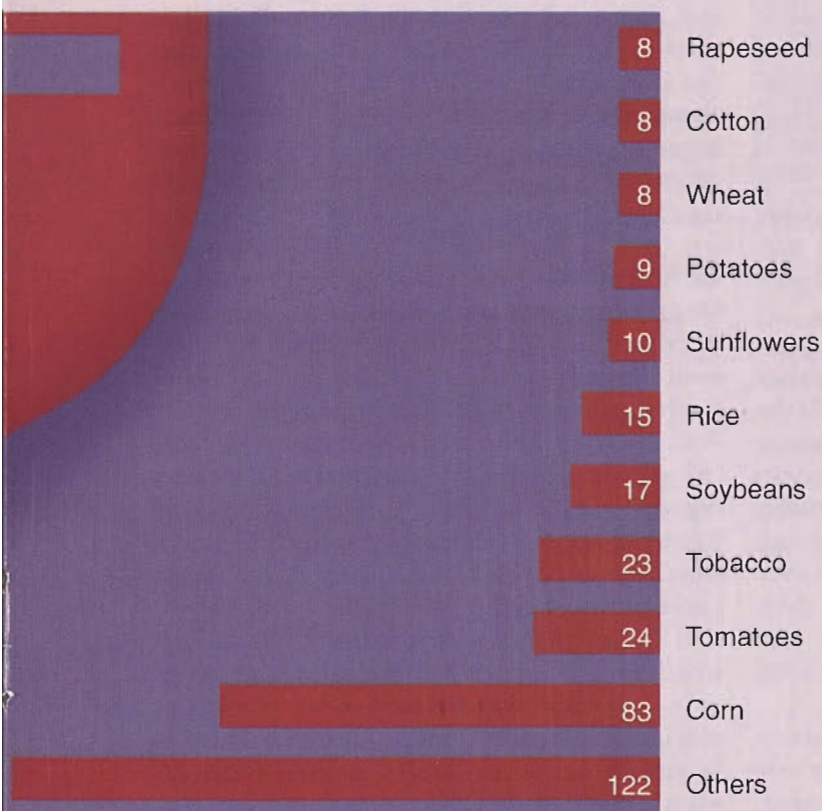
Number of new plant



certificate

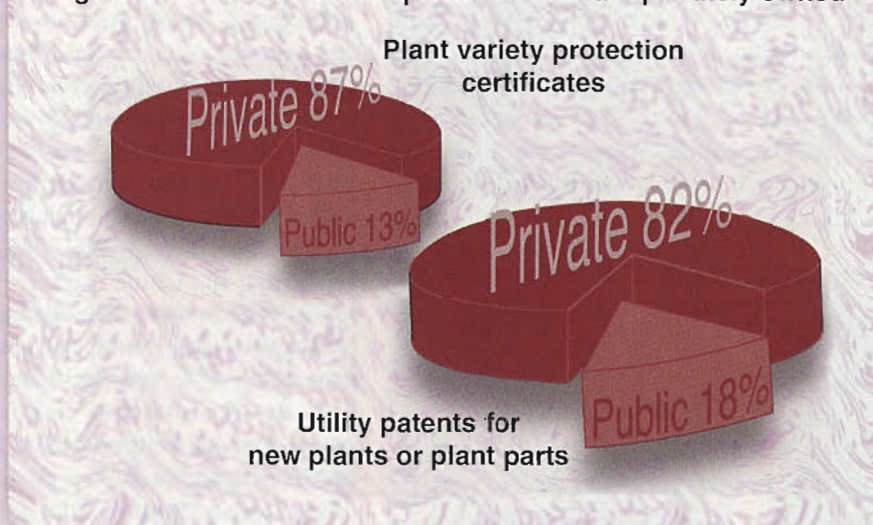
patents

Figure 4. 286 utility patents were issued between 1985 and 1994*



*Total exceeds 286 because some patents cover more than one commodity.

Figure 5. Over 80% of new plant varieties are privately owned



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In 1980, biological inventions became patentable under standard U.S. patent laws when the Supreme Court ruled in *Diamond v. Chakrabarty* that "utility patents" could be applied to microorganisms. The U.S. Patent and Trademark Office approved the use of utility patents for plants in 1985 and for animals in 1987.

The number of IPRs issued for new plant varieties has steadily increased over time (figure 2). Between 1970 and 1994, 3,306 Plant Variety Protection Certificates (PVPs) were issued for new crop varieties. By the end of 1994, 324 utility patents had been awarded for multicellular living organisms. Of these, 286 utility patents were granted for new plants or plant parts and 38 for animals (most of the animal patents were for medical research). Annual issues of plant patents for vegetatively reproduced varieties have also shown an increasing trend since 1970.

More than half of all PVPs have been issued for field crops, especially soybeans, corn, and wheat (figure 3). Vegetables and forage crops account for 27 percent and 13 percent of PVPs, respectively. The Patent and Trademark Office awarded the greatest number of utility patents for corn (figure 4), especially for inbred lines (parents of hybrid varieties). Tomatoes and tobacco have each received more than twenty patents. Researchers frequently use tobacco plants as models in genetic engineering research. Companies often apply for utility patents for varieties developed through genetic engineering.

Since 1970, more than 80 percent of PVPs and utility patents have been awarded to private companies or individuals (figure 5). The rest have gone to public institutions where breeding research tends to be directed toward enhancing genetic diversity through basic germplasm development and conservation. However, the private sector leads in the development of finished plant varieties for most agricultural field crops.

For more information

Fuglie, K., C. Klotz, and M. Gill. "AREI-Updates: New Crop Varieties." Washington DC: U.S. Department of Agriculture, Natural Resources and Environment Division, ERS No. 14, 1995.