Corn Breeding Research

This project exchanged ideas and information, coordinated research and testing, and oversaw the development of tools and techniques that enhanced desirable traits in the corn gene pool.

Who cares and why?

Corn is the most important crop in the U.S. Thanks to corn breeding research, corn productivity and quality have been maintained throughout the 20th century, with benefits from research totaling $260 billion. Plant breeding enhances the plant's gene pool, develops plant varieties that have consistently high quality and yield across environments, and provides farmers with sustainable, low-cost varieties. Though the overwhelming majority of corn breeders in the U.S. are employed by private industry, the 6.5% of corn breeders in the public sector are expected to conduct long-term, high-risk research to advance knowledge for corn improvment as well as educate and train graduate students capable of conducting independent breeding programs. During the past 50 years, the number of corn breeders who work in the public sector, in particular with state agriculture experiment stations and the U.S. Department of Agriculture, has declined dramatically.

To improve corn, scientists, industry representatives, and farmers must work together to evaluate and enhance desirable corn traits, develop screening methods for pesticide resistance, and establish successful, cost-effective breeding techniques. Coordination and long-term research projects will help scientists advance corn breeding knowledge, set up standard tools and methods, and build a network for promoting awareness that facilitate long-term genetic improvement in corn.

What has the project done so far?

NCCC-167 brought together researchers from public and private sectors to exchange information, coordinate research projects, and develop and integrate new tools and techniques for corn breeding. Together they set research priorities and detemined which genetic traits are important, desirable, and should be selected in breeding programs. The team oversaw the national and international development and evaluation of all new public sector varieties of corn. As a result, the group was able to release 40 new varieties of corn that improve the gene pool. To raise awareness and participation, NCCC-167 scientists shared research results in peer-reviewed scientific jounrals and online at http://corn2.agron.iastate.edu/NCR167. The team also focused on education and training new breeders.

The tassel--the male flower of a corn plant--produces pollen. When pollen lands on the sticky silk strands emerging from the end of an ear of corn, it germinates and moves down the strand of silk to the ear--the female flower--where it fertilizes a potential kernel. Environmental factors, like drought stress and pests can disrupt pollenization by killing the tassel so that no pollen is produced or delaying silk emergence so that it is not able to catch the pollen. Corn breeders are experimenting with varieties of corn that are more drought and pest tolerant. Photo courtesy of the National Archives.

Impact Statements

Increased corn productivity and quality by promoting rapid information exchange and coordinating research and implementation of new corn breeding tools and techniques.

Developed the B73 line of corn, which has become the most popular inbred line, generating millions of dollars in economic benefits to the industry and farmers.

Oversaw the development of new corn varieties and released 40 new inbred and synthetic lines of corn.

Coordinated testing of unreleased corn germplasm across the U.S. and Canada, providing invaluable data to corn breeders, industry, and regulators for mkaing decisions about releasing new corn varieties and hybrids.

What research is needed?

As genetic resources are improved and new lines of corn are bred, more long-term resources will be essential, including funding and high-quality storage facilities. Researchers also need to emphasize education and training of future plant breeders, so that there is a critical mass of corn breeders to meet future demands. Researchers need to make sure that further research focuses on both molecular techniques and conventional plant breeding methods, so that the resulting ways of improving corn are practical and easy to implement successfully. In addition, more researchers should be encouraged to include their corn varieites in regional test trials.

Want to know more?

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Edited and designed by Sara Delheimer

For thousands of years, farmers have altered the genetic makeup of the corn they grow. By controlling pollination, growers can manipulate which corn features, such as faster growth, drought tolerance, pest and/or pesticide resistance, are passed on to the next generation. The corn we eat today is the result of decades of breeding strategies. Photo by Lars Ploughmann.