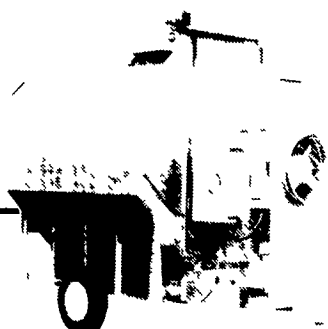
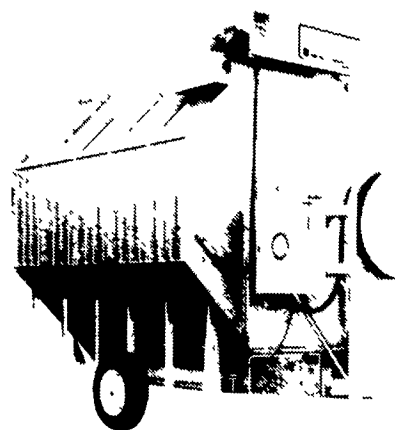


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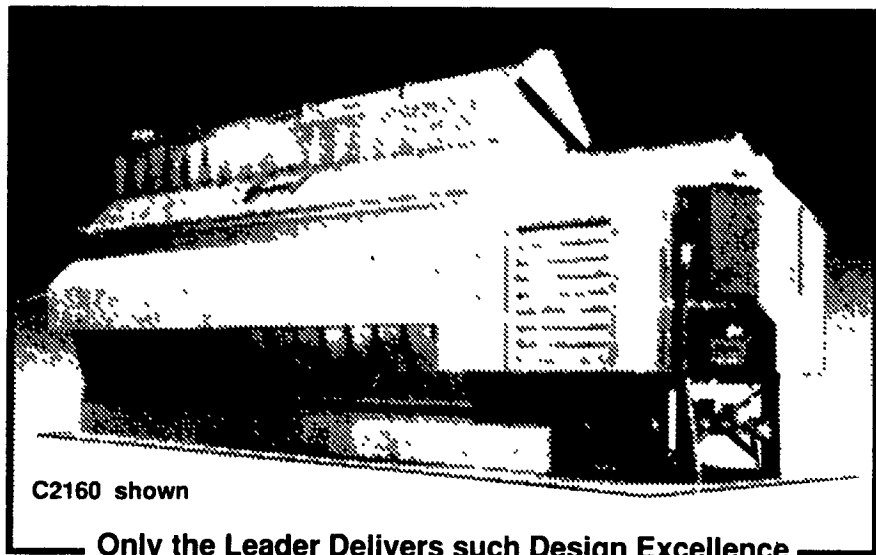
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Corn Lines Resist Pests, Give Better Yields

NEWARK, Del. — Native Americans domesticated corn from a wild grass species about 10,000 years ago. The original corn breeders on this continent, they developed a corn plant that was similar to what we know today.

But it wasn't until the 1930s, when the hybrid breeding method was introduced, that corn yields began to increase dramatically.

Today, University of Delaware (UD) researchers are developing even more productive corn lines with resistance to pests and disease that seemed impossible just a few decades ago.

This spring the college released two new inbred corn lines — DE1 and DE2 — for the seed industry. Dr. Jim Hawk, a professor in the plant and soil sciences department, and Tecle Weldekidan, research associate, developed DE1 and DE2 as potential parents of hybrids and as gene sources for improved commercial inbreds.

"DE1 and DE2 are sister lines which have intermediate levels of resistance to European corn borer, a major insect pest of corn," said Hawk. "They have the potential to produce good yields and appear to have tolerance to heat and drought conditions. The major U.S. corn companies, as well as several smaller companies, have already requested seeds."

DE1 and DE2 are not the first corn lines Hawk's breeding program has released. DE811, an inbred developed in the early 1980s, is recognized worldwide as the standard for resistance to European corn borer. DE811 has been used around the world both as a source of genetic resistance in breeding programs and for basic studies on pest resistance. Hawk and Weldekidan are hopeful that the two inbred lines will also find a niche in the seed industry.

Developing new inbred corn lines like DE1 and DE2 takes years of research. Six to seven generations of the plant must be self-pollinated. After that, the inbred must be evaluated both alone and in hybrid combinations for three to four years for yield, pest resistance and agronomic performance. Hawk began working on DE1 and DE2 in the winter of 1989 with Weldekidan and assistants Janet Burris and Norma Longhauser.

To accelerate the inbreeding process, Hawk's team grows two generations of corn each year, one in the Delmarva region in summer and another in

Florida, Mexico or Hawaii in winter.

"At any given time, we may be inbreeding some 2,500 lines," said Weldekidan. "We also test about 1,000 different hybrids each year. Of these, we select only a fraction for further research."

Developing inbreds is a labor-intensive process. When the plants begin to flower in early July, Hawk's team can be found out in corn fields with a group of 20 high school students, painstakingly hand-pollinating the plants. The first step is to cover the ear shoot with a waterproof bag before the silks appear. Pollen is then collected from the desired male plant and applied to the silks in such a way that there is no chance of contamination by foreign pollen. Hawk's entire group may work up to 10 hours a day, six days a week for an entire month.

"Timing is critical," Hawk said. "The whole process is weather-dependent because corn responds to heat and moisture, and the pollen on the tassel lasts only three to five days."

When two inbred lines are crossed, a hybrid is created. The hybrid may have higher disease and insect resistance, greater yield or a number of other qualities sought by the corn breeder.

For hybrid development, desirable traits may be contributed by either parent. In selecting a male parent, Hawk looks for good pollen production, high yield, resistance to disease and pests, standability and drought tolerance. In the female parent, grain texture and seedling emergence are particularly important.

After choosing the parents, the corn breeder's work becomes even more exacting. Weldekidan has volumes of data attesting to the meticulous record-keeping and attention to detail that are necessary. Each corn hybrid must be handled separately. One 6-acre plot translates into about 6,000 separate packages of seeds.

"Although new breeding methods use molecular biology to alter genes," Hawk said, "traditional breeding is still an essential part of line development. Working with the complete corn genome as opposed to single genes can provide broader resistance to disease, pests and adverse conditions."

"We know we'll never achieve perfection in a single inbred line," he said. "But we can continue to develop new inbreds that will produce better hybrids for the benefit of agriculture."