Ready for drought

New hybrids from Pioneer boost yields under drought stress By Karen McMahon

PIONEER REPLICATES drought stress on hybrids at its research location near Davis, CA. It averages 1 in. of rain every summer.

IN A year of plentiful rain, Pioneer Hi-Bred readies for the release of its new Drought I hybrids. These hybrids are the first of the company's drought-tolerant lines that will help ease the pain of sparse rainfall and searing heat on cornfields.

Pending final field trial results, Pioneer plans to market the Drought I hybrids next year. Marketing efforts will start in the western Corn Belt and move to other less dry areas. The new line is a milestone for the company, which started breeding for drought tolerance 50 years ago. The research paid off. Today's Pioneer hybrids yield more than twice the bushels under dry weather than hybrids grown 30 years ago.

Pioneer says growers can expect a 6% yield increase from the Drought I hybrids compared to the best of current hybrids when grown in dryer climates. The company has used native genes for this line.

By the middle of the decade, the Drought II hybrids with transgenic traits may be ready for commercial production. Early trials show these hybrids post a 10-bu./acre yield improvement under stress.

Giant greenhouse

Much of the work on the new hybrids is conducted at Pioneer's research center near Davis, CA. "The best place in the world to study drought tolerance is here in Woodland in the central California Valley," says Jeff Schussler. "It is like a giant greenhouse." The flat, fertile land receives about an inch of rain each summer.

The arid climate means Pioneer can duplicate any level of water stress across much of the 200 acres through a sophisticated irrigation system. Water is doled out through hose and drip irrigation on a row-by-row basis. The researchers also can study a drought-tolerant hybrid's performance under abundant rain. Customers won't buy drought-tolerant hybrids that offer a yield drag when growing conditions are good.

Most complex trait

Unlocking the genetics of drought tolerance has been tough. "Drought is probably the most complex trait you can choose for selection," reports Joe Keaschall. "It is not a single trait, which is simple. Instead it is impacted by many genes." This is why it has taken years longer to find the traits for drought tolerance compared to the Bt trait or a herbicide-resistant trait.

The search for drought traits is confounded by the effects of drought at different stages in the corn's development. "Early on, plants can undergo severe limitations of water," Schussler explains. "But two weeks before and after flowering when a high proportion of yield potential is determined, drought will have a much greater effect."

Also complicating the search are different lengths and types of drought stress. "If there's no cooling at night, it is devastating for plants," Keaschall says. "We need to think about the heat complex that comes with a lack of moisture."

Pioneer has focused on traits for aggressive silking and better kernel fill to the tip. It has found one gene that "has been very consistent in the last four years," Schussler says. "This gene has positive effects on silking. We can have droughts at different times of the year, and we know the gene helps maintain the number of kernels."

Pioneer's new drought-tolerant hybrids will be stacked with other traits like glyphosate tolerance and corn borer resistance. FIN