Corn Breeding for Quality

PFI farmers in 2003 continued working with corn breeders to develop varieties with high nutrient contents and seed that can be saved and planted again. The 2003 growing season was the last one of a three-state SARE grant that examined available germplasm, and it was the first year of another project that is allowing ISU and USDA breeders to bring new varieties into existence.

Illinois Farmer John Rucker (left) and Don Adams described their procedure for selecting seed in a field that was mixed corn and sorghum.

Figure 1 and Table 1, (click to view) show yields of five varieties on the farms of five PFI cooperators in 2003. The fifth treatment, "farmer's choice," varied from farm to farm and was a hybrid everywhere except the farm of **Don Adams and Nan Bonfils**. Except on this farm, the hybrids outyielded the open-pollinated variety Nokomis Gold as well as the two inbred crosses (the names beginning with "BS").

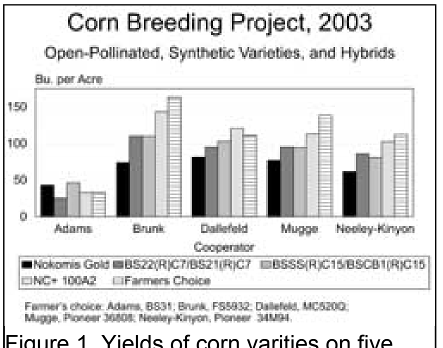

Figure 1. Yields of corn varities on five cooperator farms in 2003.

That yield difference is the reason most farmers grow hybrids. But you may have heard the stories about how corn used to have higher protein than it does now. And the higher-protein hybrids typically do not last long in the catalogs of the major seed companies - presumably because they are not top yielders. (Some seed companies may have recently re-discovered the high-protein niche, but this is the exception that proves the rule.)

Cooperator Don Adams is a proponent of feed quality. As Table 1, (click to view) shows, yield is not his top priority. Don likes corn that his cows like, starting with sweet and tender stalks that he can chop for them if pastures dry up. He grows Nokomis Gold, and he is selecting seed on his farm to adapt the variety to the conditions there. At the field day on the Adams/Bonfils farm in 2003, Don described how he decides from which plants to save ears.

At the same field day, USDA-ARS scientist Linda Pollak walked participants through a demonstration of how new traits are brought into Midwest-adapted varieties, starting with tropical corn. Those traits can include high vitamin content, oil and protein. Figure 2 shows traits for some typical hybrids and for experimental crosses in Pollak's GEM project (Genetic Enhancement of Maize). In some of these crosses, oil content was one-third higher than in typical hybrids, and protein was nearly double.

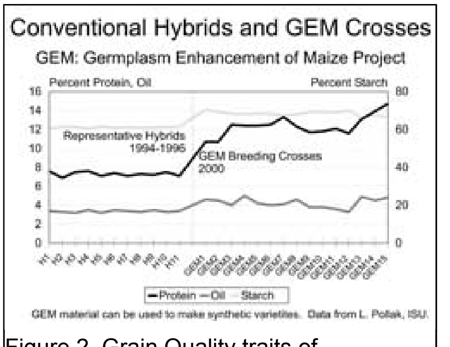

Figure 2. Grain Quality traits of experimental crosses in the GEM program compared to typical hybrids.

These characteristics are not yet available in varieties adapted to the Midwest, but they are getting the attention of some farmers and small businesses. PFI field days in 2004 will show plots where the research continues. Public sector scientists do not have the resources to develop the uniform and highly adapted hybrids that industry can produce. However, a core group of producers and processors will be waiting for the first varieties that are released in coming years.

Table 1. Open-Pollinated, Synthetic, and Hybrid Corn Evaluation

Open-Pollinated, Synthetic, and Hybrid Corn Evaluation

				TREATMENT "A"					TREATMENT "B"					TREATMENT "C"					
COOPERATOR	CROP	PREVIOUS CROP	YIELD SIGNIFI-CANCE	DESCRIPTION	YIELD (bu or T)	STAT.	TRT COSTS	$ BENEFIT	DESCRIPTION	YIELD (bu or T)	STAT.	TRT COSTS	$ BENEFIT	DESCRIPTION	YIELD (bu or T)	STAT.	TRT COSTS	$ BENEFIT	OVERALL COMMENTS
ADAMS	CORN			BS21(R)C7 x BS22(R)C7	25.7	a			FARMER'S CHOICE	33.2	a			NC+ 100A2	33.3	a			
				BSSS(R)C15 x BSCB1(R)C15	46.5	a			NOKOMIS GOLD	43.0	a								
BRUNK	CORN			BS21(R)C7 x BS22(R)C7	109.9	b			FARMER'S CHOICE	163.5	a			NC+ 100A2	143.4	a			
				BSSS(R)C15 x BSCB1(R)C15	109.6	b			NOKOMIS GOLD	74.1	c								
DALLEFELD	CORN			BS21(R)C7 x BS22(R)C7	95.2	ab			FARMER'S CHOICE	110.9	a			NC+ 100A2	120.6	a			
				BSSS(R)C15 x BSCB1(R)C15	103.1	ab			NOKOMIS GOLD	81.3	b								
MUGGE	CORN			BS21(R)C7 x BS22(R)C7	95.3	bc			FARMER'S CHOICE	138.6	a			NC+ 100A2	113.0	b			
				BSSS(R)C15 x BSCB1(R)C15	94.6	bc			NOKOMIS GOLD	76.9	c								
NEELY-KINYON	CORN			BS21(R)C7 x BS22(R)C7	85.7	bc			FARMER'S CHOICE	112.1	a			NC+ 100A2	102.5	ab			
				BSSS(R)C15 x BSCB1(R)C15	80.7	bc			NOKOMIS GOLD	61.6	c								