

Agronomy 212 – Crop Growth, Productivity, and Management

Grain Quality

Why worry about quality?

What is quality?

U.S. Standards for Grain

Grade	Minimum test weight per bushel	Maximum limits of		
		Damaged Kernels		Broken corn and foreign material
		Heat-damaged	Total kernels	
U.S. No. 1	56.0	0.1	3.0	2.0
U.S. No. 2	54.0	0.2	5.0	3.0
U.S. No. 3	52.0	0.5	7.0	4.0
U.S. No. 4	49.0	1.0	10.0	5.0
U.S. No. 5	46.0	3.0	15.0	7.0
U.S. Sample grade:				
U.S. Sample grade is corn that:				
(a) Does not meet the requirements for the grades U.S. Nos. 1, 2, 3, 4, or 5: or				
(b) Contains 8 or more stones which have an aggregate weight in excess of 0.20 percent of the sample weight, 2 or more pieces of glass, 3 or more crotalaria seeds (<i>Crotalaria</i> spp.), 2 or more castor beans (<i>Ricinus communis</i> L.), 4 or more particles of an unknown foreign substance(s) or a commonly recognized harmful or toxic substance(s), 8 or more cockleburrs (<i>Xanthium</i> spp.) or similar seeds single or in combination, or animal filth in excess of 0.20 percent in 1,000 grams; or				
(c) Has a musty, sour, or commercially objectionable foreign odor; or				
(d) Is heating or otherwise of distinctly low quality.				

Blending

New Thinking

Corn Intrinsic Qualities By Use

Use	Protein	Oil	Starch	Density	Hardness	Other
	8.0%	3.6%	60%	1.25 gm/cm ³		0.25% lysine 0.19% methionine
	High	High				Low fiber High lysine (swine) High methionine (poultry)
	Low	High	High	Moderate	Soft	
	High	Low		High	Hard	
	High			Medium High	Medium	White cob

Corn Genetic Alterations

Quality Trait	Uses	Benefit
High protein (10%+)	Livestock feed	
High lysine (0.3%+)	Hog feed	
High methionine (0.25%+)	Poultry feed	
High oil (6%+)	Animal feed	
High extractable starch	Corn wet milling	
Hard endosperm	Corn dry milling	
High yielding white corn	Alkaline cooking	

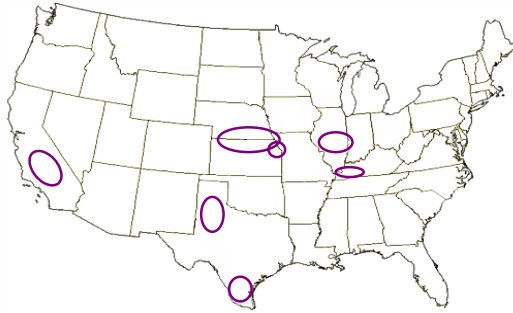
Value-added corn acres and premiums

Trait	2002 Acreage	Premiums	Growth Potential
	900,000	\$0.15-\$0.40	Modest
	500,000	\$0.10-\$0.30	Modest
	1,200,000-1,500,000	\$0.10-\$0.20	Modest
	500,000	\$0.20-\$0.30	Declining
	75,000-90,000	\$0.15-\$0.35	Modest
	45,000-50,000	\$1.00+	Modest
	125,000-175,000	\$0.07-\$0.12	Modest
	300,000-600,000	\$0.05-\$0.10	Modest
Total	3,375,000-4,045,000		
% of U.S. total acreage	4.9-5.8%		

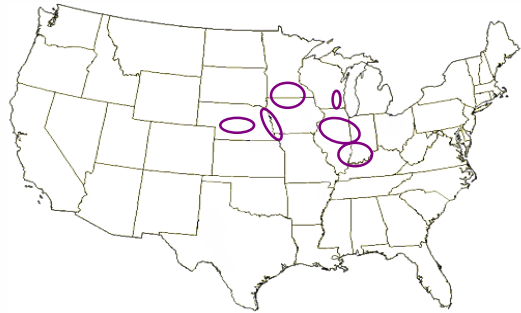
Sources: U.S. Grains Council, 2001/2002 Value-Enhanced Grain Quality Report
Ohio State University: Frequently Asked Questions about Identity Preserved Specialty Corn Production

Value-added corn growing areas

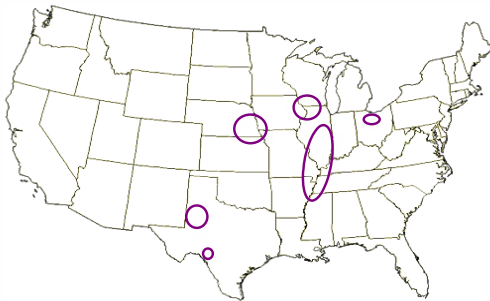
White Corn



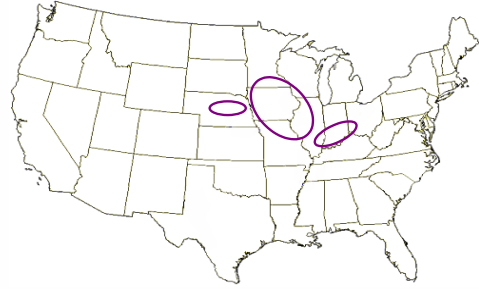
Waxy Corn



Hard Endosperm Corn



High-Oil Corn



High-oil corn

Corn – Future Traits

Soybean Intrinsic Qualities By Use

Use	Protein	Oil	Fiber	Seeds per lb	Other
	35.0%	18.5%	5.0%	2,500-2,600	
	High	High	Low		Fatty acid composition Amino acid composition
	High	Low	Low	Large or very small	Low defects Clear hilum

Soybean Genetic Alterations

Quality Trait	Uses	Benefit
High protein (38%+)	Crusher	
High oil (20%+)	Crusher	
Low linolenic oil (3%-)	Crusher	
High stearic acid	Crusher	
Low saturated fatty acids	Crusher	
Special seed size with high protein	Food manufacturer	

Specialty Soybean

Characteristics and implications of value-added grain production